



MATHS

JEE (MAIN AND ADVANCED) MATHEMATICS

DEFINITE INTEGRALS

EXAMPLE

1. Evaluate $\int_0^{\pi} \sin x \, dx$

[Watch Video Solution](#)

2. Evaluate $\int_0^a \frac{dx}{x^2 + a^2}$

[Watch Video Solution](#)

3. Evaluate $\int_1^2 \frac{(x+1)^3}{x^2} dx$



Watch Video Solution

4. Evaluate the integrals .

$$\int_0^4 |2 - x| dx$$



Watch Video Solution

5. If $a < 0 < b$ then $\int_a^b \frac{|x|}{x} dx =$



Watch Video Solution

6. Evaluate $\int_1^4 x \sqrt{x^2 - 1} dx$



Watch Video Solution

7. Evaluate $\int_0^a \sqrt{a^2 - x^2} dx$



Watch Video Solution

8. $\int_0^{\pi/2} x^2 \sin x dx =$



Watch Video Solution

9. Evaluate $\int_a^b x dx$ as the limit of a sum.



Watch Video Solution

10. Evaluate $\int_0^{\pi/2} \sin x dx$ as the limit of a sum.



Watch Video Solution

11. Evaluate $\int_a^b e^x dx$ using the definition of a definite integral as the limit of a sum.



Watch Video Solution

12. Evaluate $\int_0^n [x] dx$, ($n \in N$) where $[]$ denotes the GIF



Watch Video Solution

13. Evaluate $\int_0^n (x - [x]) dx$, $n \in N$, where $[]$ denotes the GIF



Watch Video Solution

14. Evaluate $\int_0^{n^2} [\sqrt{x}] dx$ ($n \in N$) where $[]$ denotes the GIF



View Text Solution

15. Evaluate $\int_{-n}^n [x] dx$ where $[]$ denotes the GIF (where $x \in R - Z$)



Watch Video Solution

16. Evaluate $\int_0^2 [x^2] dx$ where $[]$ denotes the GIF



Watch Video Solution

17. Evaluate $\int_0^{100} [\tan^{-1} x] dx$ where $[]$ denotes the GIF



Watch Video Solution

18. Evaluate $\int_0^{2\pi} [\sin x + \cos x] dx$ where $[]$ denotes the G.I.F.



Watch Video Solution

19. Evaluate $\int_0^2 [x^2 - x + 1] dx$ where $[]$ denotes the GIF



[Watch Video Solution](#)

20. $\int_0^{1000} e^{x - [x]} dx =$



[Watch Video Solution](#)

21. Evaluate $\int_0^{100\pi} \sqrt{1 - \cos 2x} dx$



[Watch Video Solution](#)

22. Evaluate $\int_{-\pi}^{199\pi} \sqrt{\frac{1 - \cos 2x}{2}} dx$



[Watch Video Solution](#)

23. Show that $\int_0^{n\pi + \alpha} |\sin x| dx = (2n + 1) - \cos \alpha$ where $n \in \mathbb{N}$ and $0 \leq \alpha \leq \pi$



[Watch Video Solution](#)

1. Evaluate

$$(i) \int_0^{\pi/2} \sin^2 x dx$$

[Watch Video Solution](#)**2. Evaluate**

$$(ii) \int_0^{\frac{\pi}{2}} \sqrt{1 + \sin x} dx$$

[View Text Solution](#)**3. Evaluate**

$$(iii) \int_0^1 \frac{1-x}{1+x} dx$$

[Watch Video Solution](#)

4. Evaluate

(i) $\int_0^{\frac{\pi}{3}} \frac{\cos x}{3 + 4\sin x} dx$



Watch Video Solution

5. Evaluate

(ii) $\int_0^{\frac{\pi}{2}} \frac{1}{3 + 2\cos x} dx$



Watch Video Solution

6. Evaluate

(i) $\int_0^1 \frac{dx}{e^x + e^{-x}}$



Watch Video Solution

7. Evaluate

(ii) $\int_1^2 x dx$

[Watch Video Solution](#)

8. Evaluate

(i) $\int_a^b \frac{1}{\sqrt{(x-a)(b-x)}} dx$

[Watch Video Solution](#)

9. Evaluate

(ii) $\int_a^b \sqrt{\frac{x-a}{b-x}} dx (a < x < b)$

[Watch Video Solution](#)

10. Evaluate $\int_0^{\pi/2} \frac{1}{\sin x + \cos x} dx$

[Watch Video Solution](#)

11. $\int_0^1 \sin^{-1} \sqrt{x} dx =$



Watch Video Solution

12. $\int_0^a \sqrt{\frac{a+x}{a-x}} dx =$



Watch Video Solution

13. Evaluate $\int_{-1}^{3/2} |x \sin \pi x| dx$



Watch Video Solution

14. Evaluate $\int_0^1 x e^{x^2} dx.$



Watch Video Solution

15. Find $\int_0^{\pi/2} \frac{\sin^5 x}{\sin^5 x + \cos^5 x} dx$



Watch Video Solution

16. Find the value of $\int_0^{\pi} \frac{x}{1 + \sin x} dx$



Watch Video Solution

17. Show that $\int_0^{\pi} \frac{x}{a^2 - \cos^2 x} dx = \frac{\pi^2}{2a\sqrt{a^2 - 1}} (a > 1)$



View Text Solution

18. Show that $\int_0^{\pi/2} \log(\sin x) dx = -\frac{\pi}{2} \log 2$



Watch Video Solution

19. Evaluate $\int_0^{\infty} \log\left(x + \frac{1}{x}\right) \cdot \frac{1}{1+x^2} dx$



Watch Video Solution

20. Evaluate $\int_0^{\frac{\pi}{2}} x \sin x dx$.



Watch Video Solution

21. Evaluate $\int_0^{\pi/2} \sin^4 x \cdot \cos^2 x dx$.



Watch Video Solution

22. Evaluate $\int_0^{\pi} \sin^7 x \cdot \cos^5 x dx$



Watch Video Solution

23. Evaluate $\int_0^{\pi/2} \cos^5 x dx$.



Watch Video Solution

24. Evaluate $\int_a^b x dx$



Watch Video Solution

25. Evaluate $\int_0^{\pi} \sin x dx$ as the limit of a sum.



View Text Solution

26. Evaluate $\int_0^2 e^x dx$ as the limit of a sum.



Watch Video Solution

27. Evaluate $\int_0^{\pi} \sin^2 x dx$



Watch Video Solution

28. Evaluate $\int_0^{\frac{\pi}{2}} \sin^2 x dx$



Watch Video Solution

29. Evaluate $\int_0^1 \frac{1-x}{1+x} dx$



Watch Video Solution

30. Evaluate

(i) $\int_0^{\frac{\pi}{3}} \frac{\cos x}{3 + 4\sin x} dx$



Watch Video Solution

31. Evaluate $\int_0^{\pi} \frac{1}{3 + 2\cos x} dx$



Watch Video Solution

 [View Text Solution](#)

32. $\int_0^1 \frac{dx}{e^x + e^{-x}} =$



[Watch Video Solution](#)

33. Evaluate $\int_1^2 \log x dx$



[View Text Solution](#)

34. Evaluate

(i) $\int_a^b \frac{1}{\sqrt{(x-a)(b-x)}} dx$



[Watch Video Solution](#)

35. Evaluate

(ii) $\int_a^b \sqrt{\frac{x-a}{b-x}} dx (a < x < b)$

[Watch Video Solution](#)

36. Evaluate $\int_0^{\pi/2} \frac{1}{\sin x + \cos x} dx$

[Watch Video Solution](#)

37. $\int_0^1 \sin^{-1} \sqrt{x} dx =$

[Watch Video Solution](#)

38. $\int_0^a \sqrt{\frac{a+x}{a-x}} dx =$

[Watch Video Solution](#)

39. $\int_{-\frac{3}{2}}^1 |x \sin(\pi x)| dx =$

[Watch Video Solution](#)

40. Evaluate the integrals .

$$\int_0^{\pi/2} \frac{\sin^5 x}{\sin^5 x + \cos^5 x} dx$$



Watch Video Solution

41. Find the value of $\int_0^{\pi} \frac{x}{1 + \sin x} dx$



View Text Solution

42. Find $\int_0^{\pi} \frac{x}{a^2 - \cos^2 x} dx$



View Text Solution

43. $\int_0^{\pi/2} \log(\sin x) dx =$



Watch Video Solution

44. $\int_0^{\infty} \frac{\log(1+x^2)}{1+x^2} dx =$

 [Watch Video Solution](#)

45. Find $\int_0^1 x^{3/2} \sqrt{1-x} dx$

 [Watch Video Solution](#)

46. Evaluate the integral

$$\int_0^3 -3(9-x^2)^{3/2} x dx$$

 [Watch Video Solution](#)

47. Evaluate the integral

$$\int_0^1 x^{7/2} (1-x)^{5/2} dx$$

 [Watch Video Solution](#)

48. Evaluate the integral

$$\int_0^5 x^2 (\sqrt{5-x})^7 dx$$



Watch Video Solution

49. Evaluate the integral

$$\int_0^{\pi} -\pi \sin^8 x \cos^7 x dx$$



Watch Video Solution

50. Evaluate the integral

$$\int_0^{\pi/2} \tan^5 x \cos^8 x dx$$



Watch Video Solution

51. Evaluate the integral

$$\int_3^7 \sqrt[3]{\frac{7-x}{x-3}} dx$$



Watch Video Solution

52. Evaluate the integral

$$\int_6^2 \sqrt{(6-x)(x-2)} dx$$



Watch Video Solution

53. Evaluate the integral

$$\int_0^\pi (1 + \cos x)^3 dx$$



Watch Video Solution

54. Evaluate the integral

$$\int_0^{2\pi} (1 + \cos x)^5 (1 - \cos x)^3 dx$$



Watch Video Solution

55. Evaluate $\int_0^{100} e^{x - [x]} dx$ where $[]$ denotes the greatest integer function.



Watch Video Solution

56. Evaluate $\int_0^{100\pi} \sqrt{1 + \cos 2x} dx$



View Text Solution

57. Evaluate $\int_{-\pi}^{199\pi} \sqrt{\frac{1 - \cos 2x}{2}} dx$



Watch Video Solution

58. Show that $\int_0^{n\pi+\alpha} |\sin x| dx = (2n+1) - \cos \alpha$ where $n \in \mathbb{N}$ and $0 \leq \alpha \leq \pi$



Watch Video Solution

59. Evaluate $\int_0^n [x] dx$, ($n \in \mathbb{N}$) where $[]$ denotes the GIF



Watch Video Solution

60. Evaluate $\int_0^n (x - [x]) dx$, $n \in \mathbb{N}$, where $[]$ denotes the GIF



Watch Video Solution

61. Evaluate $\int_0^{n^2} [\sqrt{x}] dx$ ($n \in \mathbb{N}$) where $[]$ denotes the GIF



Watch Video Solution

62. Evaluate $\int_0^2 [x^2] dx$ where $[]$ denotes the GIF



[Watch Video Solution](#)

63. Evaluate $\int_0^{100} [\tan^{-1} x] dx$ where $[]$ denotes the GIF

[Watch Video Solution](#)

64. Evaluate $\int_0^{2\pi} [\sin x + \cos x] dx$ where $[]$ denotes the G.I.F.

[Watch Video Solution](#)

65. Evaluate $\int_0^2 [x^2 - x + 1] dx$ where $[]$ denotes the GIF

[Watch Video Solution](#)

66. Find $\lim_{n \rightarrow \infty} \sum_{r=0}^{n-1} \frac{1}{\sqrt{n^2 - r^2}}$

[Watch Video Solution](#)

67. Evaluate $\lim_{n \rightarrow \infty} \left(\frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{3n} \right)$



Watch Video Solution

68. $\lim_{n \rightarrow \infty} \frac{1}{n} \left[\sin^2 \cdot \frac{\pi}{2n} + \sin^2 \cdot \frac{2\pi}{2n} + \dots + \sin^2 \cdot \frac{n\pi}{2n} \right] =$



Watch Video Solution

69. Find $\lim_{n \rightarrow \infty} \left\{ \frac{\sqrt{n}}{n^{3/2}} + \frac{\sqrt{n}}{(n+3)^{3/2}} + \dots + \frac{\sqrt{n}}{[n+3(n-1)]^{3/2}} \right\}$



Watch Video Solution

70. Evaluate the limit .

$$\lim_{n \rightarrow \infty} \left[\left(1 + \frac{1}{n^2} \right) \left(1 + \frac{2^2}{n^2} \right) \dots \left(1 + \frac{n^2}{n^2} \right) \right]^{\frac{1}{n}}$$



Watch Video Solution

71. $\lim_{n \rightarrow \infty} \left(\frac{n!}{n^n} \right)^{\frac{1}{n}} =$



Watch Video Solution

72. Evaluate $\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{1}{n} \left[\frac{n-i}{n+1} \right]$ by using the method of finding definite integral as the limit of a sum



View Text Solution

73. Evaluate $\lim_{n \rightarrow \infty} \frac{2^k + 4^k + 6^k + \dots + (2n)^k}{n^{k+1}}$ by using the method of finding definite integral as the limit of a sum.



Watch Video Solution

74. Evaluate the limit .

$$\lim_{n \rightarrow \infty} \frac{1}{n} \left[\frac{\tan(\pi)}{4n} + \frac{\tan(2\pi)}{4n} + \dots \dots \dots \frac{\tan(n\pi)}{4n} \right]$$



Watch Video Solution

75. Evaluate the limit .

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{i^3}{i^4 + n^4}$$



Watch Video Solution

76. Evaluate the limit .

$$\lim_{n \rightarrow \infty} \frac{1 + 2^4 + 3^4 + \dots \dots + n^4}{n^5}$$



Watch Video Solution

1. Evaluate the following integrals

(i) $\int_1^2 \frac{(x+1)^2}{\sqrt{x}} dx$



Watch Video Solution

2. Evaluate the following integrals

(ii) $\int_0^a (a^2x - x^3) dx$



Watch Video Solution

3. Evaluate the following integrals

(iii) $\int_2^3 \frac{2x}{1+x^2} dx$



Watch Video Solution

4. Evaluate the following integrals

(iv) $\int_0^4 \frac{x^2}{1+x} dx$

[Watch Video Solution](#)

5. Evaluate the following integrals

(v) $\int_0^a (\sqrt{a} - \sqrt{x})^2 dx$

[Watch Video Solution](#)

6. Evaluate the following integrals

(vi) $\int_0^1 \frac{1}{\sqrt{x+1} + \sqrt{x}} dx$

[Watch Video Solution](#)

7. Evaluate the integrals .

$$I = \int_0^1 \frac{x^2}{x^2 + 1} dx$$

[Watch Video Solution](#)

8. Evaluate the following integrals

(viii) $\int_0^3 \frac{x dx}{\sqrt{x^2 + 16}}$



Watch Video Solution

9. Evaluate the following integrals

(ix) $\int_0^1 \frac{x}{1 + \sqrt{x}} dx$



Watch Video Solution

10. Evaluate the following integrals

(x) $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \cot^2 x dx$



Watch Video Solution

11. Evaluate $\int_0^a \sqrt{a^2 - x^2} dx$

[Watch Video Solution](#)

12. Evaluate $\int_0^2 \sqrt{4 - x^2} dx$

[Watch Video Solution](#)

13. Evaluate the definite integrals .

$\int_0^\pi \sqrt{2 + 2\cos\theta} d\theta$

[Watch Video Solution](#)

14. Evaluate the following integrals

(ii) $\int_0^2 |1 - x| dx$

[Watch Video Solution](#)

15. Evaluate the following integrals

(iii) $\int_0^{\frac{\pi}{4}} \frac{1 + \sin 2x}{\cos x + \sin x} dx$



Watch Video Solution

16. Evaluate $\int_1^4 x \sqrt{x^2 - 1} dx$



Watch Video Solution

17. Evaluate : $\int_0^1 \frac{dx}{\sqrt{3 - 2x}}$



Watch Video Solution

18. Evaluate the definite integrals .

$$I = \int_1^5 \frac{dx}{\sqrt{2x - 1}}$$



Watch Video Solution

19. Evaluate the definite integrals .

$$I = \int_0^1 e^{-x^2} dx$$



Watch Video Solution

20. Evaluate the following integrals

$$(i) \int_0^{\frac{\pi}{2}} x \cos x dx$$



Watch Video Solution

21. Evaluate the following integrals

$$(ii) \int_1^{\sqrt{e}} x \log x dx$$



Watch Video Solution

22. Evaluate the following integrals

(iii) $\int_1^2 \frac{\log x}{x^2} dx$



Watch Video Solution

23. Evaluate the following integrals

(iv) $\int_0^{\pi/4} \frac{1}{1 + \sin x} dx$



Watch Video Solution

24. Evaluate the following integrals

(v) $\int_0^{\log 2} \cosh 2x dx.$



Watch Video Solution

25. Evaluate the following integrals

(vi) $\int_0^1 e^x \sinh x dx.$

[View Text Solution](#)

26. Evaluate the following integrals

(vii) $\int_1^2 x^2 \log x dx$

[Watch Video Solution](#)

EXERCISE - 2.1 (SHORT ANSWER QUESTIONS)

1. Evaluate $\int_0^{16} \frac{x^{1/4}}{1+x^{1/2}} dx$

[Watch Video Solution](#)

2. $\int_0^1 (2x+3)(\sqrt{3-2x}) dx$

[Watch Video Solution](#)

3. Evaluate the following integrals

(iii) $\int_{-1}^2 \frac{x^2}{x^2 + 2} dx$



View Text Solution

4. $\int_0^1 \frac{xe^x}{(x+1)^2} dx =$



Watch Video Solution

5. Evaluate the following integrals

(v) $\int_0^1 \sin^{-1} x dx$



Watch Video Solution

6. Evaluate the following integrals

(i) $\int_0^1 \sin^{-1} \left(\frac{2x}{1+x^2} \right) dx$

[Watch Video Solution](#)

7. Evaluate the following integrals

(ii) $\int_0^1 x^2 \sin^{-1} x dx$

[Watch Video Solution](#)

8. Evaluate the following integrals

(iii) $\int_0^{\frac{\pi}{2}} \frac{1}{4 + 5 \cos x} dx$

[Watch Video Solution](#)

9. Evaluate the following integrals

(iv) $\int_0^1 \sqrt{\frac{1-x}{1+x}} dx$

[Watch Video Solution](#)

10. Evaluate the following integrals

(v) $\int_0^1 x \tan^{-1} x dx$



Watch Video Solution

11. Evaluate the following integrals

(vi) $\int_0^{1/2} \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx$



Watch Video Solution

12. Evaluate the following integrals

(vii) $\int_0^{\pi/2} \frac{1}{2 + 3 \sin x} dx$



View Text Solution

13. Evaluate the following integrals

(viii) $\int_0^{\pi/4} \frac{1}{2 + \sin^2 x} dx$

[View Text Solution](#)

EXERCISE - 2.1 (LONG ANSWER QUESTIONS)

1. Evaluate the following integrals

$$\int_a^b \sqrt{(x-a)(b-x)} dx$$

[View Text Solution](#)

2. Evaluate the following integrals

$$\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{9 + 16 \sin 2x} dx$$

[Watch Video Solution](#)

3. Evaluate the following integrals

$$\int_3^7 \sqrt{\frac{7-x}{x-3}} dx$$

[Watch Video Solution](#)

4. Evaluate the following integrals

$$\int_4^9 \frac{1}{\sqrt{(9-x)(x-4)}} dx$$



Watch Video Solution

5. Evaluate the following integrals

$$\int_2^6 \sqrt{(6-x)(x-2)} dx$$



Watch Video Solution

EXERCISE - 2.2 (VERY SHORT ANSWER QUESTIONS)

1. Evaluate the following integrals

(i) $\int_0^{\frac{\pi}{2}} \frac{\sin^2 x - \cos^2 x}{\sin^3 x + \cos^3 x} dx$



Watch Video Solution

2. Find the values of the following integrals

(i) $\int_0^{\pi} \sin^3 x \cos^3 x dx$



Watch Video Solution

3. $\int_0^{\pi/2} \log(\tan x) dx =$



Watch Video Solution

4. Evaluate the following integrals

(i) $\int_{-1}^1 \log\left(\frac{2-x}{2+x}\right) dx$



Watch Video Solution

5. $\int_{-1}^1 \frac{x^2 \sin^{-1} x}{\sqrt{1-x^2}} dx$



Watch Video Solution

6. Evaluate the following integrals

(iii) $\int_{-1}^1 |x| dx$



Watch Video Solution

7. Evaluate the following integrals

(iv) $\int_{-1}^1 (x^4 + \sin^3 x) dx$



Watch Video Solution

8. Evaluate the following integrals

(v) $\int_{-1}^1 (x + 1) dx.$



Watch Video Solution

9. Show that $\int_0^{\pi/2} \sin^n x dx = \int_0^{\pi/2} \cos^n x dx.$

[Watch Video Solution](#)

EXERCISE - 2.2 (SHORT ANSWER QUESTIONS)

1. Evaluate the following integrals

(i) $\int_0^{\frac{\pi}{2}} \frac{\cos^{5/2} x}{\sin^{5/2} x + \cos^{5/2} x} dx$

[Watch Video Solution](#)

2. Evaluate the following integrals

$\int_0^{\frac{\pi}{2}} \frac{1}{1 + \tan x} dx$

[Watch Video Solution](#)

3. Evaluate the following integrals

(iii) $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sec x}}{\sqrt{\sec x} + \sqrt{\csc x}} dx$

[Watch Video Solution](#)

4. Evaluate the following integrals

(i) $\int_0^{\frac{\pi}{2}} \frac{2\sin x + 3\cos x}{\sin x + \cos x} dx$



Watch Video Solution

5. Evaluate the following integrals

(ii) $\int_0^{\frac{\pi}{2}} \frac{3\tan x + 3\cot x}{\tan x + \cot x} dx$



Watch Video Solution

6. Evaluate $\int_{\pi/6}^{\pi/3} \frac{\sqrt{x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$



Watch Video Solution

7. Evaluate the following integrals

(ii) $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{1}{1 + \sqrt[3]{\tan x}} dx$



Watch Video Solution

8. Find $\int -a \left(x^2 + \sqrt{a^2 - x^2} \right) dx$



Watch Video Solution

9. Evaluate $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin|x| dx$



Watch Video Solution

10. Evaluate the following integrals

(iii) $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin|2x| dx$



Watch Video Solution

EXERCISE - 2.2 (LONG ANSWER QUESTIONS)

1. Evaluate the definite integrals .

$$\int_{-\pi/2}^{\pi/2} \frac{\cos x}{1 + e^x} dx$$



Watch Video Solution

$$2. \int_{-1}^1 \frac{\cosh x}{1 + e^{2x}} dx =$$



Watch Video Solution

$$3. \text{ Show that } \int_0^a x(a - x)^n dx = \frac{a^{n+2}}{(n+1)(n+2)}.$$

$$\text{Hence find } \int_0^2 x\sqrt{2-x} dx$$



Watch Video Solution

4. $\int_0^{\pi/4} \log(1 + \tan x) dx =$



Watch Video Solution

5. Evaluate the integral

$$\int_0^1 \frac{\log(1+x)}{1+x^2} dx$$



Watch Video Solution

6. Evaluate

(i) $\int_0^{\frac{\pi}{2}} \frac{\sin^2 x}{\sin x + \cos x} dx$



Watch Video Solution

7. Evaluate

(ii) $\int_0^{\frac{\pi}{2}} \frac{x}{\sin x + \cos x} dx$



View Text Solution

8. Evaluate

(i) $\int_0^{\pi} \frac{x \sin x}{1 + \sin x} dx$



Watch Video Solution

9. Evaluate the integral

$\int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx$



Watch Video Solution

10. Evaluate

(iii) $\int_0^{\pi} \frac{x \sin^3 x}{1 + \cos^2 x} dx$



Watch Video Solution

11. Evaluate the integral

$$\int_0^{\pi} x \sin^3 x dx$$



Watch Video Solution

12. Evaluate

$$\int_0^{\pi} \sin^3 \theta (1 + 2 \cos \theta) (1 + \cos \theta)^2 d\theta$$



View Text Solution

EXERCISE - 2.3 (VERY SHORT ANSWER QUESTIONS)

1. Find the values of the following integrals

(i) $\int_0^{\frac{\pi}{2}} \sin^4 x dx$



Watch Video Solution

2. Find the values of the following integrals

(ii) $\int_0^{\frac{\pi}{2}} \sin^{10} x dx$



Watch Video Solution

3. Find the values of the following integrals

(iii) $\int_0^{\frac{\pi}{2}} \cos^{11} x dx$



Watch Video Solution

4. Find the values of the following integrals

(iv) $\int_0^{\frac{\pi}{4}} \sec^3 x dx$



Watch Video Solution

5. Find the values of the following integrals

(v) $\int_0^{\frac{\pi}{4}} \sec^6 x dx$

[Watch Video Solution](#)

6. Find the values of the following integrals

(vi) $\int_0^{\frac{\pi}{4}} \sin^3 \theta d\theta$

[Watch Video Solution](#)

7. Find the values of the following integrals

(i) $\int_0^{\frac{\pi}{2}} \sin^4 x \cos^4 x dx$

[Watch Video Solution](#)

8. Find the values of the following integrals

(ii) $\int_0^{\frac{\pi}{2}} \sin^4 x \cos^6 x dx$

[Watch Video Solution](#)

9. Find the values of the following integrals

(iii) $\int_0^{\frac{\pi}{2}} \sin^2 x \cos^7 x dx$



Watch Video Solution

10. Evaluate $\int_0^{\pi/2} \sin^5 x \cos^4 x dx$



Watch Video Solution

11. Find the values of the following integrals

(i) $\int_0^{\pi} \sin^3 x \cos^3 x dx$



Watch Video Solution

12. Find the values of the following integrals

(ii) $\int_0^{\pi} \cos^3 x \sin^4 x dx$



Watch Video Solution

13. Find the value of the integral

$$\int_0^{\pi} \sin^3 x \cos^6 x dx$$



Watch Video Solution

14. Find the values of the following integrals

(i) $\int_0^{2\pi} \sin^2 x \cos^4 x dx$



Watch Video Solution

15. Find $\int_0^{2\pi} \sin^4 x \cos^6 x dx$



Watch Video Solution

16. Find the values of the following integrals

(i) $\int_{-2\pi}^{2\pi} \cos^6 x dx$

[Watch Video Solution](#)

17. Find $\int_{-\pi/2}^{\pi/2} \sin^2 x \cos^4 x dx$

[Watch Video Solution](#)

18. Find the value of the integral

$$\int_{-\pi/2}^{\pi/2} \sin^2 \theta \cdot \cos^7 \theta d\theta$$

[Watch Video Solution](#)

19. Find the value of the integral

$$\int_{-\pi/2}^{\pi/2} \sin^3 \theta \cdot \cos^3 \theta d\theta$$

[Watch Video Solution](#)

20. Evaluate the integral

$$\int_0^{\pi} -\pi \sin^8 x \cos^7 x dx$$



Watch Video Solution

21. Find the values of the following integrals

(vi) $\int_0^{\pi/2} \tan^2 x \cos^8 x dx$



Watch Video Solution

22. Evaluate the integral

$$\int_0^{\pi} (1 + \cos x)^3 dx$$



Watch Video Solution

23. Evaluate the integral

$$\int_0^{2\pi} (1 + \cos x)^5 (1 - \cos x)^3 dx$$



[Watch Video Solution](#)

EXERCISE - 2.3 (SHORT ANSWER QUESTIONS)

1. Evaluate the integral

$$\int_0^4 (16 - x^2)^{5/2} dx$$



[Watch Video Solution](#)

2. Evaluate

(ii) $\int_0^1 x^5 (1 - x)^{5/2} dx$



[View Text Solution](#)

3. Evaluate

(iii) $\int_0^a x (a^2 - x^2)^{7/2} dx$



[Watch Video Solution](#)

4. Find the value of the integral

$$\int_0^2 x^{3/2} \sqrt{2-x} dx$$



Watch Video Solution

5. Evaluate

$$\int_0^1 x^6 \sin^{-1} x dx$$



Watch Video Solution

$$6. \int_0^a \frac{dx}{x + \sqrt{a^2 - x^2}} =$$



Watch Video Solution

7. Find the values of the following integrals

$$\int_{-3}^3 (9 - x^2)^{3/2} dx$$



[Watch Video Solution](#)

EXERCISE - 2.3 (LONG ANSWER QUESTIONS)

1. Evaluate the following integrals

(ii) $\int_0^{\pi} x \sin^5 x \cos^6 x dx$



[Watch Video Solution](#)

2. Evaluate the following integrals

(iii) $\int_0^{\pi} x \sin^7 x \cos^6 x dx$



[Watch Video Solution](#)

3. Evaluate the following integrals

(iv) $\int_{-a}^a x^2 (a^2 - x^2)^{3/2} dx$



[Watch Video Solution](#)

4. Find the values of the following integrals

$$\int_0^5 x^3 (25 - x^2)^{7/2} dx$$



Watch Video Solution

5. Find the values of the following integrals

$$\int_0^1 x^{7/2} (1 - x)^{5/2} dx$$



Watch Video Solution

6. Evaluate the integral

$$\int_0^5 x^2 (\sqrt{5 - x})^7 dx$$



Watch Video Solution

1. Evaluate the following define integrals as limit of sums :

$$\int_0^1 (x - x^2) dx$$



Watch Video Solution

2. Evaluate the following define integrals as limit of sums :

$$\int_0^2 (x^2 + 1) dx$$



Watch Video Solution

3. Evaluate the following define integrals as limit of sums :

$$\int_0^2 e^x dx$$



Watch Video Solution

4. Evaluate the following define integrals as limit of sums :

$$\int_0^4 (x + e^{2x}) dx$$



[Watch Video Solution](#)

5. Evaluate the following definite integrals as limit of sums.

$$\int_0^5 (x + 1) dx$$

[Watch Video Solution](#)

6. Evaluate the following definite integrals as limit of sums :

$$\int_0^4 x^2 dx$$

[Watch Video Solution](#)

7. Evaluate the following definite integrals as limit of sums :

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{1}{n} \left(\frac{n-i}{n+i} \right)$$

[Watch Video Solution](#)

8. $\lim_{n \rightarrow \infty} \frac{2^k + 4^k + 6^k + \dots + (2n)^k}{n^{k+1}} =$



Watch Video Solution

9. Evaluate the following definite integrals as limit of sums :

$$\lim_{n \rightarrow \infty} \left[\left(1 + \frac{1}{n}\right) \left(1 + \frac{2}{n}\right) \dots \left(1 + \frac{n}{n}\right) \right]^{1/n}$$



Watch Video Solution

10. Evaluate the limit.

$$\lim_{n \rightarrow \infty} \frac{\sqrt{n+1} + \sqrt{n+2} + \dots + \sqrt{n+n}}{n\sqrt{n}}$$



Watch Video Solution

11. Evaluate the limit .

$$\lim_{n \rightarrow \infty} \left[\frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{6n} \right]$$

[Watch Video Solution](#)

12. Evaluate the following definite integrals as limit of sums :

$$\lim_{n \rightarrow \infty} \frac{1}{n} \left[\tan. \frac{\pi}{4n} + \tan. \frac{2\pi}{4n} + \dots + \tan. \frac{n\pi}{4n} \right]$$

[Watch Video Solution](#)

13. Evaluate the following definite integrals as limit of sums :

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{i^3}{i^4 + n^4}$$

[Watch Video Solution](#)

14. Evaluate the following definite integrals as limit of sums :

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{i}{n^2 + i^2}$$

[Watch Video Solution](#)

15. Evaluate the following definite integrals as limit of sums :

$$\lim_{n \rightarrow \infty} \frac{1^4 + 2^4 + 3^4 + \dots + n^4}{n^5}$$



Watch Video Solution

16. Evaluate the limit .

$$\lim_{n \rightarrow \infty} \left[\left(1 + \frac{1}{n^2} \right) \left(1 + \frac{2^2}{n^2} \right) \dots \dots \left(1 + \frac{n^2}{n^2} \right) \right]^{\frac{1}{n}}$$



Watch Video Solution

17. Evaluate the following definite integrals as limit of sums :

$$\lim_{n \rightarrow \infty} \left[\frac{n!}{n^n} \right]^{\frac{1}{n}}$$



Watch Video Solution

18. Show that $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{r=1}^n \sec^2 \frac{r\pi}{4n} = \frac{4}{\pi}$



Watch Video Solution

19. $\lim_{n \rightarrow \infty} \left[\frac{1^2}{n^3 + 1^3} + \frac{2^2}{n^3 + 2^3} + \dots + \frac{1}{2n} \right] =$



Watch Video Solution

ADDITIONAL EXERCISE

1. Evaluate $\int_2^3 \frac{2x^5 + x^4 - 2x^3 + 2x^2 + 1}{(x^2 + 1)(x^4 - 1)} dx$



Watch Video Solution

2. Prove that $\int_0^\infty \frac{dx}{(x^2 + a^2)(x^2 + b^2)} = \frac{\pi}{2ab(a + b)}$

[Watch Video Solution](#)

3. If $I = \int_0^1 \cos \left(2 \cot^{-1} \left(\frac{\sqrt{1-x}}{1+x} \right) \right) dx$ then

[Watch Video Solution](#)

4. Show that $\int_0^{\pi/2} \frac{dx}{3 + 4 \sin x} = \frac{1}{\sqrt{7}} \log \left(\frac{4 + \sqrt{7}}{3} \right)$

[Watch Video Solution](#)

5. Show that

$$\int_e^{e^2} \frac{1}{\log x} dx = \int_1^2 \frac{e^x}{x} dx$$

[Watch Video Solution](#)

6. Show that $\int_0^{\pi/4} x \cos x \cos 3x dx = \frac{\pi - 3}{16}$



Watch Video Solution

7. Show that $\int_0^{\pi/2} \frac{\cos x}{(1 + \sin x)(2 + \sin x)} dx = \log\left(\frac{4}{3}\right)$



Watch Video Solution

8. Show that $\int_0^{\pi/2} \frac{\sin x \cos x}{\cos^2 x + 3 \cos x + 2} dx = \log\left(\frac{9}{8}\right)$



Watch Video Solution

9. Show that $\int_0^{\log 5} \frac{\sqrt{e^x - 1}}{e^x + 3} e^x dx = 4 - \pi$



Watch Video Solution

10. Show that $\int_0^{\frac{\pi}{4}} \frac{dx}{\cos^4 x - \cos^2 x \sin^2 x + \sin^4 x} = \frac{\pi}{2}$



Watch Video Solution

 Watch Video Solution

11. Show that $\int_0^{\infty} \frac{dx}{\left(x + \sqrt{1+x^2}\right)^n} = \frac{n}{n^2-1}, (n \in \mathbb{N}, n > 1)$

 Watch Video Solution

12. Show that $\int_0^{\pi/4} (\sqrt{\tan x} + \sqrt{\cot x}) dx = \frac{\pi}{\sqrt{2}}$

 Watch Video Solution

13. $\int_0^{50} e^{\{x\}} dx$ where $\{x\}$ denotes the fractional part of x

 Watch Video Solution

14. Evaluate $\int_0^{100\pi} \sqrt{\frac{1 - \cos 2x}{2}} dx$

 Watch Video Solution

15. Let $f(x)$ be a periodic function with period 1 and integrable over any finite interval. Also for two real numbers a and b and for any two positive integers m and n ($m \neq n$), $\int_a^{a+m} f(x)dx = \int_b^{b+n} f(x)dx$. Then calculate the value of $\int_m^n f(x)dx$



Watch Video Solution

16. Evaluate the following

(i) $\int_0^{30} [x]dx$



Watch Video Solution

17. Evaluate the following

(ii) $\int_{-2}^2 [x]dx$



Watch Video Solution

18. Evaluate the following

(iii) $\int_0^5 x[x] dx$



Watch Video Solution

19. Evaluate the following

(iv) $\int_0^{1.5} [x^2] dx$



View Text Solution

20. Evaluate the following

(v) $\int_0^5 [\sqrt{x}] dx$



Watch Video Solution

21. Evaluate the following

(vi) $\int_0^{25} [\sqrt{x}] dx$



Watch Video Solution

22. $\int_0^{50} (x - [x])dx =$



Watch Video Solution

23. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = |x - 2n|$ if $x \in [2n - 1, 2n + 1]$, ($n \in \mathbb{Z}$).

Then show that for any positive integer n , $\int_0^{2n} f(x)dx = n$.

Hint : f is continuous and periodic with period 2.



Watch Video Solution

EXERCISE - I

1. $\lim_{n \rightarrow \infty} \sum_{r=1}^n \left(\frac{r^3}{r^4 + n^4} \right) =$

A. $\log 2$

B. $\frac{1}{2} \log 2$

C. $\frac{1}{3}\log 2$

D. $\frac{1}{4}\log 2$

Answer: D



Watch Video Solution

2. $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{r=1}^n \sec^2 \cdot \frac{r\pi}{4n} =$

A. A) 1

B. B) $\frac{2}{\pi}$

C. C) $\frac{\pi}{4}$

D. D) $\frac{4}{\pi}$

Answer: D



Watch Video Solution

$$3. \lim_{n \rightarrow \infty} \left\{ \sum_{r=1}^n \frac{1}{n} e^{r/n} \right\} =$$

A. $e + 1$

B. $e - 1$

C. $1 - e$

D. e

Answer: B



Watch Video Solution

$$4. \lim_{n \rightarrow \infty} \sum_{r=1}^n \frac{1}{n} \left[\sqrt{\frac{n+r}{n-r}} \right]$$

A. $\frac{\pi}{2}$

B. 2π

C. $\frac{\pi}{2} - 1$

D. $\frac{\pi}{2} + 1$

Answer: D



Watch Video Solution

5. $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{r=1}^{2n} \frac{r}{\sqrt{n^2 + r^2}} =$

A. $1 + \sqrt{5}$

B. $1 - \sqrt{5}$

C. $\sqrt{3} - 1$

D. $\sqrt{3} + 1$

Answer: B



Watch Video Solution

$$6. \lim_{n \rightarrow \infty} \frac{1}{n} \left\{ f\left(\frac{1}{n}\right) + f\left(\frac{2}{n}\right) + \dots + f(2) \right\} =$$

A. $\int_0^1 f\left(\frac{1}{x}\right) dx$

B. $\int_0^1 f(x) dx$

C. $\int_0^1 f(2x) dx$

D. $\int_0^2 f(x) dx$

Answer: D



Watch Video Solution

$$7. \lim_{n \rightarrow \infty} \frac{1}{n^6} \left\{ (n+1)^5 + (n+2)^5 + \dots + (2n)^5 \right\} =$$

A. 0

B. $\frac{21}{2}$

C. $\frac{31}{2}$

D. $\frac{32}{3}$

Answer: B



Watch Video Solution

8. $\lim_{n \rightarrow \infty} \frac{1}{n} \left[\sin^2 \cdot \frac{\pi}{2n} + \sin^2 \cdot \frac{2\pi}{2n} + \dots + \sin^2 \cdot \frac{n\pi}{2n} \right] =$

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{2}{3}$

D. $\frac{3}{2}$

Answer: A



Watch Video Solution

9. $\lim_{n \rightarrow \infty} \left[\frac{1}{1 - n^2} + \frac{2}{1 - n^2} + \dots + \frac{n}{1 - n^2} \right] =$

A. $\frac{1}{2}$

B. $-\frac{1}{2}$

C. 2

D. -2

Answer: B



Watch Video Solution

10. $\lim_{n \rightarrow \infty} \left[\frac{1}{\sqrt{n^2 - 1^2}} + \frac{1}{\sqrt{n^2 - 2^2}} + \frac{1}{\sqrt{(2n - 1)}} \right] =$

A. π

B. 2π

C. $\frac{\pi}{2}$

D. $\frac{\pi}{4}$

Answer: C

[Watch Video Solution](#)

11. If $\int_0^k \frac{1}{2+8x^2} dx = \frac{\pi}{16}$ then $k =$

A. 1

B. 2

C. $\frac{1}{2}$

D. 4

Answer: C

[Watch Video Solution](#)

12. The value of $I = \int_0^{\pi/2} \frac{(\sin x + \cos x)^2}{\sqrt{1 + \sin 2x}} dx$ is

A. 0

B. 3

C. 2

D. 1

Answer: C



Watch Video Solution

13. $\int_0^{\pi} \frac{1}{1 + \sin x} dx =$

A. 1

B. 2

C. -1

D. -2

Answer: B



Watch Video Solution

14. $\int_0^{\pi/4} \frac{\sin^9 x}{\cos^{11} x} dx =$

A. $\frac{1}{9}$

B. $\frac{1}{10}$

C. $\frac{1}{99}$

D. $\frac{1}{90}$

Answer: B



Watch Video Solution

15. $\int_0^1 \sqrt{\frac{1-x}{1+x}} dx =$

A. $\frac{\pi}{2} - 1$

B. $\frac{\pi}{2} + 1$

C. $\pi - 1$

D. $\frac{3\pi}{2}$

Answer: A



Watch Video Solution

16. $\int_2^5 \sqrt{\frac{x-2}{5-x}} dx =$

A. $\frac{3\pi}{4}$

B. $\frac{2\pi}{5}$

C. $\frac{3\pi}{2}$

D. $\frac{5\pi}{2}$

Answer: C



Watch Video Solution

17. $\int_2^3 \frac{dx}{\sqrt{(x-2)(3-x)}} =$

A. π

B. $\frac{\pi}{2}$

C. $\frac{\pi}{6}$

D. 2π

Answer: A



Watch Video Solution

18. $\int_0^1 \sqrt{x(1-x)} dx =$

A. $\frac{\pi}{8}$

B. $\frac{3\pi}{8}$

C. $\frac{5\pi}{4}$

D. $\frac{\pi}{2}$

Answer: A



Watch Video Solution

19. $\int_0^{\pi/2} \frac{1}{4\cos^2 x + 9\sin^2 x} dx =$

A. $\frac{\pi}{4}$

B. $\frac{\pi}{8}$

C. $\frac{\pi}{12}$

D. $\frac{\pi}{16}$

Answer: C



Watch Video Solution

20. $\int_0^{\pi/4} \frac{dx}{2 + \sin^2 x} =$

A. $\tan^{-1} \left(\frac{\sqrt{3}}{2} \right)$

B. $\frac{1}{6} \tan^{-1} \sqrt{\frac{3}{2}}$

C. $\frac{1}{\sqrt{6}} \tan^{-1} \sqrt{\frac{3}{2}}$

D. 1

Answer: C



Watch Video Solution

21. $\int_0^{\pi/2} x \sin x dx =$

A. 0

B. 1

C. -1

D. 2

Answer: B



Watch Video Solution

22. $\int_0^{\pi/2} e^x (\cos x - \sin x) dx =$

A. 1

B. -1

C. 0

D. $\frac{1}{2}$

Answer: B



Watch Video Solution

23. $\int_0^1 \frac{xe^x}{(x+1)^2} dx =$

A. $\frac{e}{2}$

B. $1 + \frac{e}{2}$

C. $\frac{e}{2} - 1$

D. $1 - \frac{e}{2}$

Answer: C



Watch Video Solution

24. $\int_0^1 x \sin^{-1} x dx =$

A. $\frac{\pi}{8}$

B. $\frac{\pi}{4}$

C. π

D. $\frac{\pi}{2}$

Answer: A



Watch Video Solution

25. $\int_0^1 \tan^{-1} \left(\frac{2x}{1-x^2} \right) dx =$

A. $\frac{\pi}{2} - \ln 2$

B. $\pi - \ln 2$

C. $\pi + \ln 2$

D. $\frac{\pi}{4}$

Answer: A



Watch Video Solution

26. $\int_0^{\ln 2} \sinh 2x dx =$

A. $\frac{9}{8}$

B. $\frac{9}{16}$

C. $2\ln 2 - 1$

D. $e^{2\ln 2} - 1$

Answer: B



Watch Video Solution

27. $\int_0^{\pi/2} \frac{\sec x}{\sec x + \operatorname{cosec} x} dx =$

A. π

B. $\frac{\pi}{16}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{2}$

Answer: C



Watch Video Solution

28. $\int_0^{\pi/2} \frac{dx}{1 + \tan^3 x} =$

A. π

B. $\frac{\pi}{4}$

C. $\frac{\pi}{2}$

D. 2π

Answer: B



Watch Video Solution

29. $\int_0^{\pi/2} \frac{200\sin x + 100\cos x}{\sin x + \cos x} dx =$

A. 50π

B. 25π

C. 75π

D. 150π

Answer: C



Watch Video Solution

30. $\int_0^{\pi/2} \frac{5\tan x - 3\cot x}{\tan x + \cot x} dx =$

A. $\frac{\pi}{2}$

B. 2π

C. π

D. $\frac{\pi}{4}$

Answer: A



Watch Video Solution

31. $\int_0^{\pi/2} \frac{16 \sin x \cdot \cos x}{\sin^4 x + \cos^4 x} dx =$

A. $\frac{\pi^2}{4}$

B. $\frac{\pi^2}{2}$

C. π^2

D. 4π

Answer: D



Watch Video Solution

32. $\int_0^{\infty} \frac{\log x}{1+x^2} dx =$

A. π

B. 2π

C. 1

D. 0

Answer: D



Watch Video Solution

33. $\int_0^1 x(1-x)^n dx =$

A. $\frac{1}{n+1} - \frac{1}{n+2}$

B. $\frac{1}{n+1} + \frac{1}{n+2}$

C. $\frac{1}{n+2}$

D. $\frac{1}{n+2}$

Answer: A



Watch Video Solution

34. The value of the integral, $\int_3^6 \frac{\sqrt{x}}{\sqrt{9-x} + \sqrt{x}} dx$ is

A. $1/2$

B. $3/2$

C. 3

D. 1

Answer: B



Watch Video Solution

35. $\int_{\pi/6}^{\pi/3} \frac{1}{1 + \tan^3 x} dx =$

A. $\frac{\pi}{12}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{6}$

Answer: A



Watch Video Solution

36. $\int_{-1}^1 \frac{\sqrt{1+x+x^2} - \sqrt{1-x+x^2}}{\sqrt{1+x+x^2} + \sqrt{1-x+x^2}} dx =$

A. 2

B. 4

C. 6

D. 0

Answer: D



Watch Video Solution

37. $\int_{-1}^1 (ax^3 + bx) dx = 0$ for

A. any values of a and b

B. $a > 0, b > 0$ only

C. $a > 0, b < 0$ only

D. $a < 0, b < 0$ only

Answer: A



Watch Video Solution

38. The value of $\int_{-\pi/2}^{\pi/2} (x^3 + x \cos x + \tan^5 x + 1) dx =$

A. 0

B. $\frac{\pi}{4}$

C. $\frac{\pi}{2}$

D. π

Answer: D



Watch Video Solution

39. $\int_{-\pi/2}^{\pi/2} \ln\left(\frac{2 - \sin\theta}{2 + \sin\theta}\right) d\theta =$

A. 0

B. 1

C. 2

D. -1

Answer: A



Watch Video Solution

40. $\int_{\pi/2}^{\pi/2} e^{\sin^2 x} \cdot \sin^{2n+1} x dx =$

A. $2e$

B. 0

C. 1

D. $\frac{e}{2}$

Answer: B



Watch Video Solution

41. $\int_0^{\pi} \cos^3 x dx =$

A. -1

B. 0

C. 1

D. $2\sqrt{2}$

Answer: B



Watch Video Solution

42. $\int_0^{\pi} \sin^5 2x dx =$

A. -1

B. 0

C. 1

D. $2\sqrt{2}$

Answer: B



Watch Video Solution

43. $\int_0^{\pi} \frac{x}{1 + \cos^2 x} dx =$

A. $\frac{1}{2\sqrt{2}}$

B. $\frac{\pi^2}{2}$

C. $\frac{\pi^2}{\sqrt{2}}$

D. $\frac{\pi^2}{2\sqrt{2}}$

Answer: D



Watch Video Solution

44. $\int_0^{\pi} \frac{x \tan x}{\sec x + \cos x} dx =$

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. $\frac{\pi^2}{4}$

D. $\frac{\pi^2}{2}$

Answer: C



Watch Video Solution

45. $\int_{-2}^2 (x - |x|) dx =$

A. 0

B. 2

C. 4

D. -4

Answer: D



Watch Video Solution

46. If $a < b < 0$ then $\int_a^b \frac{|x|}{x} dx =$

A. $a - b$

B. $b - a$

C. $a + b$

D. 0

Answer: A



Watch Video Solution

47. If $a < 0 < b$ then $\int_a^b \frac{|x|}{x} dx =$

A. $a - b$

B. $b - a$

C. $a + b$

D. 0

Answer: C



Watch Video Solution

48. $\int_{-2}^3 |x - 2| dx =$

A. 0

B. $\frac{5}{2}$

C. $\frac{7}{2}$

D. $\frac{17}{2}$

Answer: D



Watch Video Solution

49. $\int_0^{\pi} |\cos\theta - \sin\theta| d\theta$

A. 2

B. $\sqrt{2}$

C. $2\sqrt{2}$

D. 4

Answer: C



Watch Video Solution

50. $\int_0^{\pi} (\cos x + |\cos x|) dx =$

A. 2

B. 0

C. 1

D. $\frac{1}{2}$

Answer: A



Watch Video Solution

51. $\int_0^1 |\sin 2\pi x| dx =$

A. 2π

B. $\frac{2}{\pi}$

C. $\frac{\pi}{2}$

D. π

Answer: B



Watch Video Solution

52. $\int_{1/e}^e |\log x| dx =$

A. $1 - \frac{1}{e}$

B. $1 + \frac{1}{e}$

C. $2\left(1 - \frac{1}{e}\right)$

D. $\left(1 + \frac{1}{e}\right)$

Answer: C



Watch Video Solution

53. $\int_0^5 [x] dx =$

A. 0

B. 5

C. 10

D. 15

Answer: C



Watch Video Solution

54. Evaluate the following

(vi) $\int_0^{25} [\sqrt{x}] dx$

A. 50

B. 25

C. 75

D. 70

Answer: D

[Watch Video Solution](#)

55. Evaluate $\int_0^{100\pi} \sqrt{\frac{1 - \cos 2x}{2}} dx$

A. 100

B. 200

C. 50

D. 400

Answer: B



Watch Video Solution

56. $\int_0^{50} (x - [x])dx =$

A. 50

B. 10

C. 25

D. 100

Answer: C



Watch Video Solution

57. $\int_0^{\pi} \sin^8 x \cdot \frac{x}{2} dx =$

A. $\frac{35\pi}{128}$

B. $\frac{5\pi}{128}$

C. $\frac{25\pi}{128}$

D. $\frac{3\pi}{128}$

Answer: A



Watch Video Solution

58. Find the values of the following integrals

(i) $\int_{-2\pi}^{2\pi} \cos^6 x dx$

A. 0

B. $\frac{5\pi}{4}$

C. $\frac{5\pi}{8}$

D. $\frac{3\pi}{8}$

Answer: B



Watch Video Solution

59. $\int_0^{\pi/4} \tan^5 x dx =$

A. $\frac{1}{2} \ln 2 + \frac{1}{4}$

B. $\frac{1}{2} \ln 2 - \frac{1}{4}$

C. $\frac{1}{4} \ln 2 - \frac{1}{4}$

D. $\frac{1}{2} \ln 4$

Answer: B



Watch Video Solution

60. $\int_0^{\pi/4} (\tan^4 x + \tan^2 x) dx =$

A. 1

B. $\frac{1}{2}$

C. $\frac{1}{3}$

D. $\frac{1}{4}$

Answer: C



Watch Video Solution

61. Find the values of the following integrals

(v) $\int_0^{\frac{\pi}{4}} \sec^6 x dx$

A. $\frac{8}{15}$

B. $\frac{35}{8}$

C. $\frac{44}{15}$

D. $\frac{28}{15}$

Answer: D

[Watch Video Solution](#)

62. $\int_0^{\pi/2} \sin^8 x \cdot \cos^2 x dx =$

A. $\frac{\pi}{512}$

B. $\frac{3\pi}{512}$

C. $\frac{5\pi}{512}$

D. $\frac{7\pi}{512}$

Answer: D

[Watch Video Solution](#)

63. $\int_0^{\pi/2} \sin^6 x \cdot \cos^5 x dx =$

A. $\frac{8}{693}$

B. $\frac{5}{693}$

C. $\frac{4}{693}$

D. $\frac{10}{693}$

Answer: A



Watch Video Solution

64. $\int_{-\pi/2}^{\pi/2} \sin^4 x \cdot \cos^6 x dx =$

A. $\frac{3\pi}{128}$

B. $\frac{3\pi}{256}$

C. $\frac{3\pi}{572}$

D. $\frac{3\pi}{64}$

Answer: B



Watch Video Solution

65. $\lim_{x \rightarrow 0} \frac{\int_0^x \sin^2 t \cos t dt}{x^3} =$

A. 1

B. $\frac{1}{2}$

C. $\frac{1}{3}$

D. $\frac{2}{3}$

Answer: C



Watch Video Solution

66. $\lim_{x \rightarrow 3} \frac{1}{x-3} \int_3^x e^t dt =$

A. e^3

B. $\frac{1}{e}$

C. e^2

D. e

Answer: A



Watch Video Solution

67. Statement I : The value of the integral $\int_{\pi/6}^{\pi/3} \frac{dx}{1 + \sqrt{\tan x}}$ is equal to $\frac{\pi}{6}$

Statement II : $\int_a^b f(x) dx = \int_a^b f(a + b - x) dx$

- A. Statement-1 is true, Statement-2 is false
- B. Statement-1 is false, Statement-2 is true
- C. Statement-2 is a correct explanation for Statement-1
- D. Statement-1 is true, Statement-2 is true, Statement-2 is not a correct explanation for Statement-1

Answer: B



Watch Video Solution

EXERCISE - II

1. $\lim_{n \rightarrow \infty} \left[\frac{1}{na} + \frac{1}{na+1} + \frac{1}{na+2} \dots + \frac{1}{nb} \right] =$

A. $\log\left(\frac{b}{a}\right)$

B. $\log\left(\frac{a}{b}\right)$

C. $\log a$

D. $\log b$

Answer: A



Watch Video Solution

2. $\lim_{n \rightarrow \infty} \left\{ \frac{1}{2n+1} + \frac{1}{2n+2} + \dots + \frac{1}{3n} \right\} =$

A. $\log_e\left(\frac{3}{2}\right)$

B. $\log_e\left(\frac{2}{3}\right)$

C. $\log_e\left(\frac{4}{3}\right)$

D. $\log_e\left(\frac{1}{3}\right)$

Answer: A



Watch Video Solution

3. $\lim_{n \rightarrow \infty} \left(\frac{1^m + 2^m + 3^m + \dots + n^m}{n^{m+1}} \right) =$

A. $\frac{1}{m+1}$

B. $\frac{1}{m+2}$

C. $\frac{1}{m}$

D. $\frac{1}{m+3}$

Answer: A



Watch Video Solution

4. $\lim_{n \rightarrow \infty} \left(\frac{1 + 2^4 + 3^4 + \dots + n^4}{n^5} \right) - \lim_{n \rightarrow \infty} \left(\frac{1 + 2^3 + 3^3 + \dots + n^3}{n^5} \right) =$

A. 0

B. $\frac{1}{4}$

C. $\frac{1}{5}$

D. $\frac{1}{30}$

Answer: C



Watch Video Solution

5. $\lim_{n \rightarrow \infty} \frac{2^k + 4^k + 6^k + \dots + (2n)^k}{n^{k+1}} =$

A. $\frac{2^k}{k+1}$

B. $\frac{4^k}{k+1}$

C. $\frac{1}{k+1}$

D. 1

Answer: A



Watch Video Solution

6. $\lim_{n \rightarrow \infty} \left[\frac{1^3}{n^4 + 1^4} + \frac{2^3}{n^4 + 2^4} + \dots + \frac{1}{2n} \right] =$

A. $\frac{1}{4} \log 4$

B. $\frac{1}{2} \log 2$

C. $\frac{1}{4} \log 2$

D. $\frac{1}{4} \log 2$

Answer: D



Watch Video Solution

7. $\lim_{n \rightarrow \infty} \left\{ \frac{n+1}{n^2 + 1^2} + \frac{n+2}{n^2 + 2^2} + \dots + \frac{1}{n} \right\}$

A. $\frac{\pi}{4} + \frac{1}{4} \log 2$

B. $\frac{\pi}{2} + \frac{1}{4} \log 2$

C. $\frac{\pi}{2} + \frac{1}{2}\log 2$

D. $\frac{\pi}{4} + \frac{1}{2}\log 2$

Answer: D



Watch Video Solution

8. $\lim_{n \rightarrow \infty} \left[\frac{1}{n^2} \sec^2 \cdot \frac{1}{n^2} + \frac{2}{n^2} \sec^2 \cdot \frac{4}{n^2} + \dots + \frac{1}{n} \sec^2 1 \right] =$

A. $\frac{1}{2} \sec 1$

B. $\frac{1}{2} \operatorname{cosec} 1$

C. $\tan 1$

D. $\frac{1}{2} \tan 1$

Answer: D



Watch Video Solution

9. $\lim_{n \rightarrow \infty} \left(\frac{\sqrt{1} + 2\sqrt{2} + 3\sqrt{3} + \dots + n\sqrt{n}}{n^{5/2}} \right) =$

A. 1

B. $\frac{5}{2}$

C. 0

D. $\frac{2}{5}$

Answer: D



Watch Video Solution

10. $\lim_{n \rightarrow \infty} \left[\frac{\sqrt{n^2 - 1^2}}{n^2} + \frac{\sqrt{n^2 - 2^2}}{n^2} + \frac{\sqrt{n^2 - 3^2}}{n^2} + \dots + n \text{ terms} \right] =$

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{6}$

Answer: A



Watch Video Solution

11. $\lim_{n \rightarrow \infty} \left(\frac{1}{\sqrt{4n^2 - 1}} + \frac{1}{\sqrt{4n^2 - 2^2}} + \dots + \frac{1}{\sqrt{3n^2}} \right) =$

A. 0

B. 1

C. $\frac{\pi}{3}$

D. $\frac{\pi}{6}$

Answer: D



Watch Video Solution

12. $\lim_{n \rightarrow \infty} \left(\frac{1}{\sqrt{2n-1^2}} + \frac{1}{\sqrt{4n-2^2}} + \frac{1}{\sqrt{6n-3^2}} + \dots + \frac{1}{n} \right) =$

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{6}$

D. $\frac{\pi}{3}$

Answer: B



Watch Video Solution

13.

$\lim_{n \rightarrow \infty} \left(\frac{1}{\sqrt{n^2}} + \frac{1}{\sqrt{n^2+n}} + \frac{1}{\sqrt{n^2+2n}} + \frac{1}{\sqrt{n^2+3n}} + \dots + \frac{1}{\sqrt{n^2+n(n-1)}} \right) =$

A. $2\sqrt{2}$

B. 2

C. $2 - 2\sqrt{2}$

D. $2\sqrt{2} - 2$

Answer: D



Watch Video Solution

14. $\lim_{n \rightarrow \infty} \left[\frac{n^{1/2}}{n^{3/2}} + \frac{n^{1/2}}{(n+3)^{3/2}} + \frac{n^{1/2}}{(n+6)^{3/2}} + \dots + \frac{n^{1/2}}{\{n+3(n-1)\}^{3/2}} \right] =$

A. $\frac{1}{3}$

B. $\frac{1}{5}$

C. $\frac{1}{10}$

D. $\frac{1}{2}$

Answer: A



Watch Video Solution

15. If $S_n = \left\{ \frac{1}{1 + \sqrt{n}} + \frac{1}{2 + \sqrt{2n}} + \frac{1}{3 + \sqrt{3n}} + \dots + \frac{1}{n + \sqrt{n^2}} \right\}$ then

$$\lim_{n \rightarrow \infty} S_n =$$

A. $2 \log 2$

B. $\log 2$

C. $3 \log 2$

D. $\frac{1}{2} \log 2$

Answer: A



Watch Video Solution

16. $\lim_{n \rightarrow \infty} \frac{3}{n} \left[1 + \sqrt{\frac{n}{n+3}} + \sqrt{\frac{n}{n+6}} + \sqrt{\frac{n}{n+9}} + \dots + \sqrt{\frac{n}{4n-3}} \right] =$

A. 1

B. 2

C. 3

D. 4

Answer: B



Watch Video Solution

17. $\lim_{n \rightarrow \infty} \left(\frac{n!}{n^n} \right)^{\frac{1}{n}} =$

A. e

B. 2e

C. $\frac{1}{2e}$

D. $\frac{1}{e}$

Answer: D



Watch Video Solution

18. Evaluate the limit .

$$\lim_{n \rightarrow \infty} \left[\left(1 + \frac{1}{n^2}\right) \left(1 + \frac{2^2}{n^2}\right) \cdots \left(1 + \frac{n^2}{n^2}\right) \right]^{\frac{1}{n}}$$

A. $\frac{2}{e^2} e^{\pi/2}$

B. $\frac{e^2}{2} e^{\pi/2}$

C. $\frac{2}{e^{\pi/2}} e^2$

D. $\frac{e^{\pi/2}}{2e^2}$

Answer: A



Watch Video Solution

19. If $f(n) = \frac{1}{n} \{(n+1)(n+2)\dots 2n\}^{1/n}$ then $\lim_{n \rightarrow \infty} f(n) =$

A. $2e$

B. $2/e$

C. $4/e$

D. $4e$

Answer: C



Watch Video Solution

20. $\lim_{n \rightarrow \infty} \left(\frac{(2n)!}{n!n^n} \right)^{\frac{1}{n}} =$

A. $\frac{2}{e}$

B. $\frac{3}{e}$

C. $\frac{4}{e}$

D. $\frac{1}{e}$

Answer: C



Watch Video Solution

21. The solution for x of the equation $\int_{\sqrt{2}}^x \frac{dt}{|t|\sqrt{t^2 - 1}} = \frac{\pi}{2}$ is

A. $2\sqrt{2}$

B. 2

C. π

D. $-\sqrt{2}$

Answer: D



Watch Video Solution

22. $\int_0^1 \frac{dx}{x + \sqrt{x}} =$

A. $\ln 2$

B. $\ln 2 + 1$

C. $2\ln 2$

D. $2\ln 2 - 1$

Answer: C



Watch Video Solution

23. $\int_0^{\infty} \frac{45a}{(3 + a + at)^4} dt =$

A. $\frac{15}{(3 + a)^2}$

B. $\frac{15}{(3 + a)^3}$

C. $\frac{15}{3(3 + a)^3}$

D. $\frac{15}{a(3 + a)^2}$

Answer: B



Watch Video Solution

24. For $a > 1, b > 1$, the value of $\int_0^{\infty} (a^{-x} - b^{-x}) dx =$

A. $\ln(ab)$

B. $\frac{1}{\ln(ab)}$

C. $\frac{1}{\ln a} + \frac{1}{\ln b}$

D. $\frac{1}{\ln a} - \frac{1}{\ln b}$

Answer: D



Watch Video Solution

25. If $\int_{\ln 2}^x (e^x - 1)^{-1} dx = \ln\left(\frac{3}{2}\right)$ then $x =$

A. $\ln 4$

B. 1

C. e^2

D. $\frac{1}{e}$

Answer: A



Watch Video Solution

26. $\int_0^{\log 5} \frac{e^x \sqrt{e^x - 1}}{e^x + 3} dx =$

A. $\pi + 2$

B. $\pi - 2$

C. $4 - \pi$

D. $4 + \pi$

Answer: C



Watch Video Solution

27. $\int_2^3 \frac{1}{x^2 - x} dx =$

A. $\ln. \frac{2}{3}$

B. $\ln. \frac{4}{3}$

C. $\ln. \frac{8}{3}$

D. $\ln. \frac{1}{4}$

Answer: B



Watch Video Solution

$$28. \int_0^3 \frac{3x+1}{x^2+9} dx =$$

A. $\ln(2\sqrt{2}) + \frac{\pi}{12}$

B. $\ln(2\sqrt{2}) + \frac{\pi}{2}$

C. $\ln(2\sqrt{2}) + \frac{\pi}{6}$

D. $\ln(2\sqrt{2}) + \frac{\pi}{3}$

Answer: A



Watch Video Solution

$$29. \int_0^1 \frac{dx}{x^2 + 2x\sin\alpha + 1} =$$

A. $\left(\frac{\pi}{4} - \frac{\alpha}{2}\right) \operatorname{cosec}\alpha$

B. $\left(\frac{\pi}{4} + \frac{\alpha}{2}\right) \operatorname{cosec} \alpha$

C. $\left(\frac{\pi}{4} + \frac{\alpha}{2}\right) \sec \alpha$

D. $\left(\frac{\pi}{4} - \frac{\alpha}{2}\right) \sec \alpha$

Answer: D



Watch Video Solution

30. $\int_0^{\pi/4} \frac{\sin^2 x \cos^2 x}{(\sin^3 x + \cos^3 x)^2} dx =$

A. $\frac{1}{3}$

B. $\frac{1}{6}$

C. $\frac{1}{2}$

D. 1

Answer: B



Watch Video Solution

31. $\int_{1/2}^1 \frac{1}{\sqrt{x-x^2}} dx =$

A. π

B. 0

C. $\frac{\pi}{4}$

D. $\frac{\pi}{2}$

Answer: D



Watch Video Solution

32. $\int_0^{\infty} \frac{dx}{\left(x + \sqrt{x^2 + 1}\right)^3} =$

A. $\frac{3}{8}$

B. $\frac{3}{4}$

C. $\frac{3}{2}$

D. $\frac{8}{5}$

Answer: A



Watch Video Solution

33. If $\int_0^b \frac{dx}{1+x^2} = \int_b^\infty \frac{dx}{1+x^2}$, then b=

A. $\tan^{-1} \cdot \frac{1}{3}$

B. $\frac{\sqrt{3}}{2}$

C. $\sqrt{2}$

D. 1

Answer: D



Watch Video Solution

34. $\int_0^{\pi/2} \frac{8 + 7\cos x}{(7 + 8\cos x)^2} dx$ is equal to

A. $1/7$

B. $2/7$

C. $3/7$

D. $4/7$

Answer: A



Watch Video Solution

35. $\int_{1/3}^1 \frac{(x - x^3)^{1/3}}{x^4} dx =$

A. 4

B. 6

C. 8

D. 12

Answer: B



Watch Video Solution

36. $\int_1^e \frac{(\ln x)^3}{x} dx =$

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{1}{4}$

D. 1

Answer: C



Watch Video Solution

37. $\int_2^4 \frac{\sqrt{x^2 - 4}}{x^4} dx =$

A. $\frac{3}{32}$

$$\sqrt{3}$$

B. $\frac{\sqrt{3}}{32}$

C. $\frac{3}{8}$

D. $\frac{\sqrt{3}}{8}$

Answer: B



Watch Video Solution

38. $\int_0^1 \sin \left(2 \tan^{-1} \sqrt{\frac{1+x}{1-x}} \right) dx =$

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{2}$

D. π

Answer: B



View Text Solution

39. $\int_0^{\pi/2} \frac{\sin x + \cos x}{3 + \sin 2x} dx =$

A. $\frac{1}{4} \ln 3$

B. $\frac{1}{2} \ln 3$

C. $\ln 3$

D. $2 \ln 3$

Answer: B



Watch Video Solution

40. $\int_0^{\pi/4} [\sqrt{\tan x} + \sqrt{\cot x}] dx$

A. $\frac{\pi}{\sqrt{2}}$

B. $\frac{\pi}{2}$

C. $\frac{3\pi}{\sqrt{2}}$

D. π

Answer: A



Watch Video Solution

41. $2 \int_0^1 \frac{\tan^{-1} x}{x} dx =$

A. $\int_0^{\pi/2} \frac{\sin x}{x} dx$

B. $\int_0^{\pi/2} \frac{x}{\sin x} dx$

C. $\int_0^{\pi/2} \frac{1}{\sin x} dx$

D. $\int_0^{\pi} \frac{x}{\sin x} dx$

Answer: B



Watch Video Solution

42.

If

$$\int_0^{\infty} \frac{x^2 dx}{(x^2 + a^2)(x^2 + b^2)(x^2 + c^2)} = \frac{\pi}{2(a+b)(b+c)(c+a)} \text{ then } \int_0^{\infty} \frac{dx}{(x^2 + 4)(x^2 + 9)}$$

A. $\frac{\pi}{60}$

B. $\frac{\pi}{20}$

C. $\frac{\pi}{40}$

D. $\frac{\pi}{80}$

Answer: A**Watch Video Solution**

$$43. \int_0^{\pi} \frac{1}{3 + 2\sin x + \cos x} dx =$$

A. π

B. $\frac{\pi}{4}$

C. $\frac{\pi}{2}$

D. 2π

Answer: B



View Text Solution

44. $\int_0^{\pi/2} \sin 2x \cdot \tan^{-1}(\sin x) dx =$

A. $\frac{\pi}{2} - 1$

B. $\frac{\pi}{2} + 1$

C. $\frac{\pi}{2}$

D. $1 - \frac{\pi}{2}$

Answer: A



Watch Video Solution

45. $\int_0^1 \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx =$

A. 0

B. 1

C. 2

D. 3

Answer: B



Watch Video Solution

46. $\int_0^{\pi/2} e^x \left(\frac{1 + \sin x}{1 + \cos x} \right) dx =$

A. e^π

B. $e^{\pi/2}$

C. e

D. 1

Answer: B



Watch Video Solution

47. $\int_2^e \left(\frac{1}{\ln x} - \frac{1}{(\ln x)^2} \right) dx =$

A. 0

B. e

C. $e - 2\log_2 e$

D. $2\log_2 e$

Answer: C



Watch Video Solution

48. If $A = \int_0^1 \frac{e^t}{1+t} dt$ then $\int_0^1 e^t \ln(1+t) dt =$

A. $e \ln 2 - A$

B. $e \ln 2 + A$

C. $Ae^{\ln 2}$

D. $A\ln 2$

Answer: A



Watch Video Solution

49. $\int_0^1 \frac{(1 - x^2)dx}{x^4 + x^2 + 1} =$

A. $-\frac{1}{2}\ln 3$

B. $\frac{1}{2}\ln 3$

C. $\ln 3$

D. $2\ln 3$

Answer: B



Watch Video Solution

50. If $k \int_0^1 x f(3x) dx = \int_0^3 t f(t) dt$ then $k =$

A. 9

B. 3

C. $\frac{1}{9}$

D. $\frac{1}{3}$

Answer: A



Watch Video Solution

51. If $\frac{d}{dx} f(x) = g(x)$ then $\int_a^b f(x) g(x) dx =$

A. $\frac{f(b) - f(a)}{2}$

B. $\frac{f(a) - f(b)}{2}$

C. $\frac{f^2(b) - f^2(a)}{2}$

D. $\frac{f^2(a) - f^2(b)}{2}$

Answer: C



Watch Video Solution

52. Let $\frac{d}{dx}f(x) = \frac{e^{\sin x}}{x}, x > 0$.

If $\int_1^4 \frac{3}{x} e^{\sin(x^3)} dx = F(k) - F(1)$ then one of the possible value of k is

A. 63

B. 64

C. 16

D. 32

Answer: B



Watch Video Solution

53. Let $f(x)$ be a function satisfying $f'(x) = f(x)$ with $f(0) = 1$ and $g(x)$ be a function that satisfies $f(x) + g(x) = x^2$. Then the value of the integral

$\int_0^1 f(x)g(x)dx$, is

A. $e + \frac{e^2}{2} + \frac{5}{2}$

B. $e - \frac{e^2}{2} - \frac{3}{2}$

C. $e - \frac{e^2}{2} - \frac{5}{2}$

D. $e + \frac{e^2}{2} - \frac{3}{2}$

Answer: B



Watch Video Solution

54. Let $F(x) = f(x) + f\left(\frac{1}{x}\right)$, where $f(x) = \int_1^x \frac{\ln t}{1+t} dt$, then $F(e) =$

A. 2

B. $1/2$

C. 0

D. 1

Answer: B



Watch Video Solution

55. If $f(x) = (1 + \tan x) \left[1 + \tan \left(\frac{\pi}{4} - x \right) \right]$ and $g(x)$ is a function with domain $\mathbb{R}$, then $\int_0^1 x^3 g(f(x)) dx =$

A. $\frac{1}{2} g\left(\frac{\pi}{4}\right)$

B. $\frac{1}{4} g(2)$

C. $\frac{1}{4} g(1)$

D. 1

Answer: B



Watch Video Solution

56. $y = \int_x^{x^2} \sqrt{5 - t^2} dt$ then the value of $\frac{dy}{dx}$ at $x = \sqrt{2}$ is

A. $1 - \sqrt{3}$

B. $\sqrt{3}(2\sqrt{6} - 1)$

C. $2\sqrt{2} - \sqrt{3}$

D. $2\sqrt{2} + \sqrt{3}$

Answer: C



Watch Video Solution

57. If $\int_e^x t f(t) dt = \sin x - x \cos x - \frac{x^2}{2}$ for all $x \in \mathbb{R} - \{0\}$ then the value of $f\left(\frac{\pi}{6}\right)$ is

A. 0

B. 1

C. $-\frac{1}{2}$

D. $\frac{3}{2}$

Answer: C

[Watch Video Solution](#)

58. If $\int_0^{b-c} f(x+c)dx = k \int_b^c f(x)dx$ then $k =$

A. 0

B. 1

C. 2

D. -1

Answer: D

[Watch Video Solution](#)

59. If f is every where continuous function then $\frac{1}{c} \int_{ac}^{bc} f\left(\frac{x}{c}\right)dx =$

A. $\frac{1}{c} \int_a^b f(x)dx$

B. $c \int_b^a f(x)dx$

C. $\int_{ac^2}^{bc^2} f(x) dx$

D. $\int_a^b f(x) dx$

Answer: D



Watch Video Solution

60. If $\int_0^\pi f(\tan x) dx = \lambda$ then $\int_0^{2\pi} f(\tan x) dx =$

A. $\frac{\lambda}{2}$

B. -2λ

C. 2λ

D. $-\frac{\lambda}{2}$

Answer: C



Watch Video Solution

61. $\int_0^2 \frac{2x - 2}{2x - x^2} dx =$

A. 0

B. 2

C. 3

D. 4

Answer: A



Watch Video Solution

62. Evaluate

(i) $\int_0^{\frac{\pi}{2}} \frac{\sin^2 x}{\sin x + \cos x} dx$

A. $\sqrt{2} \ln(\sqrt{2} + 1)$

B. $\ln(\sqrt{2} + 1)$

C. $\frac{1}{\sqrt{2}} \ln(\sqrt{2} + 1)$

D. 1

Answer: C



Watch Video Solution

63. $\int_0^1 \tan^{-1} \left(\frac{2x - 1}{1 + x - x^2} \right) dx =$

A. 0

B. 1

C. $\frac{\pi}{4}$

D. $\frac{\pi}{8}$

Answer: A



Watch Video Solution

64. $\int_0^{\infty} \frac{\ln x}{x^2 + a^2} dx =$

A. $\left(\frac{\ln a}{a}\right) \frac{\pi}{4}$

B. 0

C. $\left(\frac{\ln a}{a}\right) \frac{\pi}{3}$

D. $\left(\frac{\ln a}{a}\right) \frac{\pi}{2}$

Answer: D



Watch Video Solution

65. $\int_0^{\pi/2} \ln(\tan x + \cot x) dx =$

A. $\frac{\pi}{2} \ln 2$

B. 1

C. $\pi \ln 2$

D. $2\pi \ln 2$

Answer: C



Watch Video Solution

66. Evaluate the integral

$$\int_0^1 \frac{\log(1+x)}{1+x^2} dx$$

A. $\frac{\pi}{4} \ln 2$

B. $\frac{\pi}{2} \ln 2$

C. $\frac{\pi}{8} \ln 2$

D. $\pi \ln 2$

Answer: C



Watch Video Solution

67. $\int_0^{2\pi} \ln(1 + \cos x) dx =$

A. $\pi \ln 2$

B. $-\pi \ln 2$

C. $-2\pi \ln 2$

D. $2\pi \ln 2$

Answer: C



Watch Video Solution

68. $\int_0^{\pi/2} \frac{\sin 8x \cdot \log(\cot x)}{\cos 2x} dx =$

A. 0

B. 1

C. $1/2$

D. $\pi/2$

Answer: A



Watch Video Solution

69. $\int_0^{4014} \frac{2^x}{2^x + 2^{4041-x}} dx =$

A. 2^{2007}

B. 2^{4014}

C. 4041

D. 2007

Answer: D



Watch Video Solution

70. $\int_0^{\pi/2} \frac{1}{1 + e^{\sqrt{2}\sin(x-\pi/4)}} dx =$

A. 0

B. $\pi/2$

C. $\pi/8$

D. $\pi/4$

Answer: D



Watch Video Solution

71. If $f(y) = e^y$, $g(y) = y: y > 0$ and $F(t) = \int_0^t f(t-y)g(y)dy$, then

A. $F(t) = te^t$

B. $F(t) = te^{-t}$

C. $F(t) = 1 - e^{-t}(1+t)$

D. $F(t) = e^t - (1+t)$

Answer: D



Watch Video Solution

72. $\int_0^{2\pi} \frac{1}{e^{\sin x} + 1} dx =$

A. π

B. 0

C. 2π

D. $\frac{\pi}{2}$

Answer: A



Watch Video Solution

73. The value of $\int_{-\pi}^{\pi} \frac{\cos^2 x}{1 + a^x} dx, a > 0$ is

A. 2π

B. $\frac{\pi}{a}$

C. $\frac{\pi}{2}$

D. $a\pi$

Answer: C



Watch Video Solution

74. $\int_{-1}^1 \frac{\cosh x}{1 + e^{2x}} dx =$

A. 0

B. 1

C. $\frac{e^2 - 1}{2e}$

D. $\frac{e^2 + 2}{2e}$

Answer: C



Watch Video Solution

75. If $f(x)$ and $g(x)$ are continuous functions on the interval $[0, 4]$ satisfying $f(x) = f(4 - x)$ and $g(x) + g(4 - x) = 3$ and $\int_0^4 f(x) dx = 2$ then

$\int_0^4 f(x)g(x)dx =$

A. 0

B. 1

C. 2

D. 3

Answer: D



Watch Video Solution

76. If $f(a + b - x) = f(x)$, then $\int_a^b x f(x) dx =$

A. $\left(\frac{a+b}{2}\right) \int_a^b f(x) dx$

B. $\int_a^b f(x) dx$

C. $(a+b) \int_a^b f(x) dx$

D. 0

Answer: A



Watch Video Solution

$$77. \int_2^5 \frac{[x^2 + 49 - 14x]}{[x^2 - 14x + 49] + [x^2]} dx =$$

A. $\frac{1}{2}$

B. $\frac{3}{2}$

C. $\frac{5}{2}$

D. $\frac{7}{2}$

Answer: B



Watch Video Solution

$$78. \int_{-1}^1 \frac{2\sin x - 3x^2}{4 - |x|} dx =$$

A. $6 \int_0^1 \frac{x^2}{4 - |x|} dx$

B. $-6 \int_0^1 \frac{x^2}{4 - |x|} dx$

C. $-6 \int_0^1 \frac{x^2}{4 + |x|} dx$

D. 0

Answer: B



Watch Video Solution

79. $\int_{-1}^1 \frac{17x^5 - x^4 + 29x^3 - 31x + 1}{x^2 + 1} dx =$

A. $\frac{4}{5}$

B. $\frac{5}{4}$

C. $\frac{4}{3}$

D. $\frac{3}{4}$

Answer: C



Watch Video Solution

80. $\int_{-\pi}^{\pi} \frac{2x(1 + \sin x)}{1 + \cos^2 x} dx =$

A. π^2

B. $\frac{\pi^2}{2}$

C. $\frac{\pi^2}{4}$

D. $2\pi^2$

Answer: A



View Text Solution

81. If $f(x) = \begin{bmatrix} x & \cos x & e^{x^2} \\ \sin x & x^2 & \sec x \\ \tan x & x^4 & 2x^2 \end{bmatrix}$ then $\int_{-\pi/2}^{\pi/2} f(x) dx =$

A. 0

B. 1

C. -1

D. 2

Answer: A



View Text Solution

82. $\sum_{n=1}^{10} \int_{-2n-1}^{2n} \sin^{27} x dx + \sum_{n=1}^{10} \int_{2n}^{2n+1} \sin^{27} x dx =$

A. 0

B. 1

C. 26

D. 27

Answer: A



View Text Solution

83. $\int_{-3\pi/2}^{-\pi/2} \left[(x + \pi)^3 + \cos^2(x + 3\pi) \right] dx =$

A. $\frac{\pi}{2}$

B. $\frac{\pi}{4} - 1$

C. $\frac{\pi^4}{32}$

D. $\frac{\pi^4}{32} + \frac{\pi}{2}$

Answer: A



Watch Video Solution

84. $\int_{-\pi/2}^{\pi/2} \cos^3 \theta (1 + \sin \theta)^2 d\theta =$

A. $\frac{5}{8}$

B. $\frac{8}{5}$

C. 0

D. $\frac{5}{16}$

Answer: B



View Text Solution

85. $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \cos^{-4} x dx =$

A. $-\frac{8}{3}$

B. $\frac{8}{3}$

C. $-\frac{3}{8}$

D. $\frac{3}{8}$

Answer: B



Watch Video Solution

86. $\int_{\ln \lambda}^{\ln \left(\frac{1}{\lambda} \right)} \frac{f\left(\frac{x^2}{3}\right)(f(x) + f(-x))}{g(3x^2)(g(x) - g(-x))} dx =$

A. 0

B. 1

C. λ

D. $\frac{1}{\lambda}$

Answer: A



Watch Video Solution

87. $\int_{-1}^1 \frac{1}{(1+x^2)^2} dx =$

A. 0

B. 1

C. $\frac{\pi}{4} + \frac{1}{2}$

D. $\frac{\pi}{4} - \frac{1}{2}$

Answer: C



Watch Video Solution

88. $f(x) = \int_0^x \ln\left(\frac{1-t}{1+t}\right) dt \Rightarrow$

- A. $f(x)$ is an even function
- B. $f(x)$ is an odd function
- C. $f(x)$ is neither even nor odd
- D. $f(x)$ cannot be a function

Answer: A



Watch Video Solution

89. $\int_0^a (f(x) + f(-x)) dx =$

- A. $2 \int_0^a f(x) dx$
- B. $\int_{-a}^a f(x) dx$
- C. 0
- D. $-\int_{-a}^a f(-x) dx$

Answer: B



Watch Video Solution

90. $\int_{-1}^3 \left(\tan^{-1} \frac{x}{(x^2 + 1)} + \tan^{-1} \frac{x^2 + 1}{x} \right) dx =$

A. 2π

B. π

C. 4π

D. $\frac{\pi}{2}$

Answer: B



Watch Video Solution

91. $\int_0^{\sin^2 x} \sin^{-1} \sqrt{t} dt + \int_0^{\cos^2 x} \cos^{-1} \sqrt{t} dt =$

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. π

D. 2π

Answer: A



Watch Video Solution

92. $\int_0^1 \cot^{-1}(1 - x + x^2) dx =$

A. $\pi - \ln 2$

B. $\frac{\pi}{2} - \ln 2$

C. $\pi + \ln 2$

D. $\frac{\pi}{2} + \ln 2$

Answer: B



Watch Video Solution

93. If for every integer n , $\int_n^{n+1} f(x) dx = n^2$ then the value of $\int_{-2}^4 f(x) dx =$

A. 13

B. 15

C. 17

D. 19

Answer: D



Watch Video Solution

94. If $f(x) = \begin{cases} x^2 & \text{for } 0 \leq x \leq 1 \\ \sqrt{x} & \text{for } 1 \leq x \leq 2 \end{cases}$ then $\int_0^2 f(x) dx =$

A. $\frac{4\sqrt{2}}{3}$

B. $\frac{4\sqrt{2} - 1}{3}$

C. $\frac{\sqrt{2}}{3}$

D. $\frac{1}{3}$

Answer: B



Watch Video Solution

95. If $\int_{-3}^2 f(x) dx = \frac{7}{3}$ and $\int_{-3}^9 f(x) dx = -\frac{5}{6}$ then $\int_2^9 f(x) dx =$

A. $\frac{3}{2}$

B. $-\frac{3}{2}$

C. $-\frac{19}{6}$

D. $\frac{19}{6}$

Answer: C



Watch Video Solution

96. If $\int_{-1}^4 f(x)dx = 4$ and $\int_2^4 [3 - f(x)]dx = 7$ then $\int_{-1}^2 f(x)dx =$

A. -2

B. 3

C. 5

D. 8

Answer: C



Watch Video Solution

97. The value of the integral $\int_0^{\infty} \frac{x \log x}{(1+x^2)^2} dx$ is

A. 1

B. -1

C. 0

D. $\frac{\pi}{2}$

Answer: C



Watch Video Solution

98. $\int_0^{\pi/2} (\sin^{100} x - \cos^{100} x) dx =$

A. $\frac{1}{100}$

B. $\frac{100!}{100^{100}}$

C. $\frac{\pi}{100}$

D. 0

Answer: D



Watch Video Solution

99. For $m, n \in N$ and $m \neq n$ then the value of $\int_0^{\pi} \sin mx \sin nx \, dx =$

A. 0

B. mn

C. 1

D. π

Answer: A



Watch Video Solution

100. For $n \in N$, the value of $\int_0^\pi \sin^n x \cdot \cos^{2n-1} x dx$ is

A. 0

B. n

C. $2n - 1$

D. $\frac{n\pi}{8}$

Answer: A



Watch Video Solution

101. For $n \in N$, $\int_0^{2\pi} \frac{x \sin^{2n} x}{\sin^{2n} x + \cos^{2n} x} dx =$

A. π

B. π^2

C. $\pi/2$

D. $\pi^2/2$

Answer: B



Watch Video Solution

102. $\int_0^{(\pi/2)} \frac{x dx}{\sin x + \cos x} =$

A. $\pi \log(\sqrt{2} + 1)$

B. $\frac{\pi}{2\sqrt{2}} \log(\sqrt{2} + 1)$

C. $\pi\sqrt{2} \log(\sqrt{2} + 1)$

D. 0

Answer: B



Watch Video Solution

103. $\int_0^{\pi} \frac{xdx}{a^2\cos^2x + b^2\sin^2x} =$

A. $\frac{\pi^2}{ab}$

B. $\frac{\pi^2}{2ab}$

C. $\frac{\pi^2}{4ab}$

D. $\frac{2\pi^2}{3ab}$

Answer: B



Watch Video Solution

104. $\int_0^{\pi} xf(\sin x)dx$ is equal to

A. $\frac{\pi}{2}\ln 2$

B. $-\frac{\pi^2}{2}\ln 2$

C. $-\frac{\pi}{2}\ln 2$

D. $-2\pi\ln 2$

Answer: B



Watch Video Solution

105. If $\int_0^\pi x f(\sin x) dx = A \int_0^{\pi/2} (\sin x) dx$, then A is

A. 0

B. 2π

C. $\pi/4$

D. π

Answer: D



Watch Video Solution

106. $\int_{\pi/4}^{3\pi/4} \frac{x}{1 + \sin x} dx =$

A. $\sqrt{2}\pi$

B. $(\sqrt{2} - 1)\pi$

C. π

D. 1

Answer: B



Watch Video Solution

107. If $f(x) = \frac{e^x}{1 + e^x}$, $I_1 = \int_{f(-a)}^{f(a)} xg\{x(1 - x)\}dx$ and $I_2 = \int_{f(-a)}^{f(a)} g\{x(1 - x)\}dx$,

then the value of $\frac{I_2}{I_1}$ is

A. 2

B. 1

C. -1

D. -3

Answer: A



Watch Video Solution

108. If $f(t) = \int_{-t}^t \frac{e^{-|x|}}{2} dx$ then $\lim_{t \rightarrow \infty} f(t) =$

A. 1

B. 1/2

C. 0

D. -1

Answer: A



Watch Video Solution

109. $\int_{-2}^3 |1 - x^2| dx =$

A. $28/3$

B. $1/3$

C. $7/3$

D. $14/3$

Answer: A



Watch Video Solution

110. $\int_{e^{-1}}^{e^2} \left| \frac{\log x}{x} \right| dx =$

A. $\frac{2}{5}$

B. 2

C. 5

D. $\frac{5}{2}$

Answer: D



Watch Video Solution

111. The integral $\int_0^x \sqrt{1+4 \sin^2(x/2 - 4 \sin(x/2))} dx$ equals

A. $\pi - 4$

B. $\frac{2\pi}{3} - 4 - 4\sqrt{3}$

C. $4\sqrt{3} - 4$

D. $4\sqrt{3} - 4 - \frac{\pi}{3}$

Answer: D



Watch Video Solution

112. $\int_{\pi}^{10\pi} |\sin x| dx =$

A. 18

B. 16

C. 14

D. 0

Answer: A



Watch Video Solution

113. $\int_{-2}^2 |[x]| dx =$

A. 1

B. 2

C. 3

D. 4

Answer: D



Watch Video Solution

114. $\int_0^{\pi} [\cot x] dx$, where $[\cdot]$ denotes the greatest integer function, is equal to

A. 1

B. -1

C. $-\frac{\pi}{2}$

D. $\frac{\pi}{2}$

Answer: C



Watch Video Solution

115. $\int_1^4 \ln[x] dx =$

A. $\ln 4$

B. $\ln 6$

C. $\ln 8$

D. $\ln 3$

Answer: B



Watch Video Solution

116. If $[x]$ represents greatest integer $\leq x$ then $\int_1^{3/2} [2x + 1] dx =$

A. 1

B. 3

C. $\frac{1}{2}$

D. $\frac{3}{2}$

Answer: D



Watch Video Solution

117. $\int_0^2 [x^2 - 1] dx =$

A. $4 - \sqrt{3} - \sqrt{2}$

B. $4 + \sqrt{3} + \sqrt{2}$

C. $\sqrt{3} - 1$

D. $\sqrt{2} + 1$

Answer: A



Watch Video Solution

118. If $[x]$ represents greatest integer $\leq x$ then $\int_0^{\sqrt{2}} [x^2] dx =$

A. $2 - \sqrt{2}$

B. $2 + \sqrt{2}$

C. $\sqrt{2} + 1$

D. $\sqrt{2} - 1$

Answer: D



Watch Video Solution

119. The value of $\int_1^a [x] f'(x) dx$, $a > 1$, where $[x]$ denotes the greatest integer not exceeding x is

- A. $af(a) - \{f(1) + f(2) + \dots + f([a])\}$
- B. $[a]f(a) - \{f(1) + f(2) + \dots + f([a])\}$
- C. $[a]f([a]) - \{f(1) + f(2) + \dots + f(a)\}$
- D. $af([a]) - \{f(1) + f(2) + \dots + f(a)\}$

Answer: B



Watch Video Solution

120. $\sum_{n=1}^{100} \int_{n-1}^n e^{x-[x]} dx =$

A. $\frac{e^{100} - 1}{e - 1}$

B. $\frac{e - 1}{100}$

C. $100(e - 1)$

D. $\frac{e^{100} - 1}{100}$

Answer: C



Watch Video Solution

121. $\int_0^{100} \sin(x - [x])\pi dx =$

A. $\frac{100}{\pi}$

B. $\frac{200}{\pi}$

C. 100π

D. 200π

Answer: B



Watch Video Solution

122. $\int_0^{[x]} \frac{2^x}{2^x} dx =$

A. $-\frac{[2x]}{\ln 2}$

B. $\frac{[2x]}{\ln 2}$

C. $-\frac{[x]}{\ln 2}$

D. $\frac{[x]}{\ln 2}$

Answer: D



Watch Video Solution

123. $\int_0^3 \sqrt{\frac{x^3}{3-x}} dx =$

A. $\frac{17\pi}{8}$

B. $\frac{27\pi}{8}$

C. $\frac{34\pi}{17}$

D. 1

Answer: B



Watch Video Solution

[Watch Video Solution](#)

124. $\int_0^a x^3 (ax - x^2)^{3/2} dx =$

A. $\frac{9\pi a^7}{2048}$

B. $\frac{7\pi a^7}{2048}$

C. $\frac{\pi a^7}{1024}$

D. $\frac{5\pi a^7}{2048}$

Answer: A

[Watch Video Solution](#)

125. $\int_0^{\pi/2} x \sin^8 x dx =$

A. $\frac{35\pi^2}{1024}$

B. $\frac{3\pi^2}{128}$

C. $\frac{\pi^2}{32}$

D. $\frac{5\pi^2}{32}$

Answer: A



Watch Video Solution

126. $\int_0^{2\pi} x \sin^6 x \cos^5 x dx =$

A. 0

B. $\frac{5\pi}{32}$

C. $\frac{8\pi}{693}$

D. $\frac{35\pi}{64}$

Answer: A



Watch Video Solution

127. $\int_0^{\infty} \frac{x^3}{(1+x^2)^{9/2}} dx =$

A. $\frac{1}{35}$

B. $\frac{3}{35}$

C. $\frac{2}{35}$

D. $\frac{4}{35}$

Answer: C



Watch Video Solution

128. If $I_n = \int_0^{\pi/4} \tan^n x dx$ then $I_2 + I_4, I_3 + I_5, I_4 + I_6, \dots$ are in

A. A.P.

B. G.P.

C. H.P.

D. A.G.P.

Answer: C



Watch Video Solution

129. If $I_n = \int_0^{\pi/4} \tan^n x dx$ then $\lim_{n \rightarrow \infty} n(I_n + I_{n+2}) =$

A. $1/2$

B. 1

C. ∞

D. 0

Answer: B



Watch Video Solution

130. $I_{m,n} = \int_0^1 x^m (\ln x)^n dx =$

A. 0

B. $\frac{n}{m+1}$

C. $-\frac{n}{m+1} I_{m-1,n}$

D. $-\frac{n}{m+1}I_{m,n-1}$

Answer: D



Watch Video Solution

131. $\lim_{x \rightarrow 0} \frac{x^2}{\int_0^x \tan^{-1} t dt}$

A. 2

B. $\frac{1}{2}$

C. -2

D. 4

Answer: A



Watch Video Solution

132. $\lim_{x \rightarrow 0} \frac{\int_0^{x^2} \sec^2 t dt}{x \sin x} =$

A. 1

B. 0

C. 3

D. 2

Answer: A



Watch Video Solution

133. Let $f: R \rightarrow R$ be a differentiable function having $f(2) = 6, f'(2) = \frac{1}{48}$

.Then $\lim_{x \rightarrow 2} \int_6^{f(x)} \frac{4t^3}{x-2} dt$

A. 24

B. 36

C. 12

D. 18

Answer: D



Watch Video Solution

134. Let $P(x)$ be a function defined on $\mathbb{R}$ such that $P(x) = P'(1 - x)$, $\forall x \in [0, 1]$, $P(0) = 1$, $P(1) = 41$ then $\int_0^1 P(x) dx =$

A. $\sqrt{41}$

B. 21

C. 41

D. 42

Answer: B



Watch Video Solution

135. If $I_1 = \int_1^2 \frac{dx}{\sqrt{1+x^2}}$ and $I_2 = \int_1^2 \frac{dx}{x}$ then

A. $I_1 = I_2$

B. $I_1 < I_2$

C. $I_1 > I_2$

D. $I_1 I_2 = 1$

Answer: B



Watch Video Solution

136. If $I_1 = \int_0^{3\pi} f(\sin^2 x) dx$ and $I_2 = \int_0^{\pi} f(\sin^2 x) dx$ then

A. $I_1 = I_2$

B. $I_1 = 2I_2$

C. $I_1 = 4I_2$

D. $I_1 = 3I_2$

Answer: D



Watch Video Solution

137. $I = \int_0^1 e^{x^2} dx \Rightarrow$

A. $1 \geq 0$

B. $1 < I < e$

C. $I \geq e$

D. $1 > 4$

Answer: B



Watch Video Solution

138. If $I_1 = \int_0^1 2^{x^2} dx$, $I_2 = \int_0^1 2^{x^3} dx$, $I_3 = \int_1^2 2^{x^2} dx$, $I_4 = \int_1^2 2^{x^3} dx$ then

A. $I_1 > I_2$

B. $I_2 > I_1$

C. $I_3 > I_4$

D. $I_3 = I_4$

Answer: A



Watch Video Solution

139. If $[x]$ denotes the greatest integer less than or equal to x then

$$\int_1^{\infty} \left[\frac{1}{1+x^2} \right] dx =$$

A. 1

B. $\frac{1}{2}$

C. 0

D. 2

Answer: C



Watch Video Solution

[Watch Video Solution](#)

140. $\int_0^{\infty} \left[\frac{2}{e^x} \right] dx =$

A. $\log_e 2$

B. e^2

C. 0

D. $\frac{2}{e}$

Answer: A

[Watch Video Solution](#)

141. Let $I = \int_0^1 \frac{\sin x}{\sqrt{x}} dx$ and $J = \int_0^1 \frac{\cos x}{\sqrt{x}} dx$ which one of the following is true

A. $I < \frac{2}{3}$ & $J < 2$

B. $I < \frac{2}{3}$ & $J > 2$

C. $I > \frac{2}{3}$ & $J < 2$

D. $I > \frac{2}{3}$ & $J > 2$

Answer: A



Watch Video Solution

142. Which of the following is true Statement-I : $\int_0^{2\pi} \sqrt{\frac{1 - \cos 2x}{2}} dx = 4$

Statement-II : $\int_{-1}^1 \log\left(\frac{1+x}{1-x}\right) dx = 2 \int_0^1 \frac{\log(1+x)}{1-x} dx$

A. Only I

B. Only II

C. Both I and II

D. Neither I nor II

Answer: A



Watch Video Solution

143. Which of the following are false :

Statement-I : $\int_0^{\pi/2} \frac{\sqrt{\cos x}}{\sqrt{\cos x} + \sqrt{\sin x}} dx = \frac{\pi}{2}$

Statement-II : $\int_0^{\pi/2} \log(\tan x) dx = 1$

Statement-III: $\int_0^{\pi/2} \log \sin x dx = -\pi \log 2$

A. Only I, II

B. Only II, III

C. Both I and II

D. All the three

Answer: D



Watch Video Solution

144. Which of the following are true:

I : $\int_0^4 \sqrt{x^2 - 4x + 4} dx = 4$

$$\text{II} : \int_0^2 \sqrt{x^2 - 4x + 4} dx = 2$$

$$\text{III} : \int_2^4 \sqrt{x^2 - 4x + 4} dx = 2$$

A. Only I, II

B. Only II, III

C. Both I and II

D. Only III

Answer: D



Watch Video Solution

145. Arrange the following according to their values in ascending order

A) $\int_0^\pi |\sin x| dx$

B) $\int_0^{2\pi} |\sin x| dx$

C) $\int_0^{3\pi} |\sin x| dx$

A. A, B, C

B. C, B, A

C. C, A, B

D. A, C, B

Answer: A



Watch Video Solution

146. If $2\int_0^1 \tan^{-1} x dx = \int_0^1 \cot^{-1}(1 - x + x^2) dx$, then $\int_0^1 \tan^{-1}(1 - x + x^2) dx$ is equal to

A. $\frac{\pi}{2} + \log 2$

B. $\log 2$

C. $\frac{\pi}{4} + \log 4$

D. $\log 4$

Answer: B



Watch Video Solution

147. Arrange the following according to their values in ascending order

A) $\int_0^1 \sqrt{1-x^2} dx$

B) $\int_0^1 \frac{1}{\sqrt{1-x^2}} dx$

C) $\int_0^{1/\sqrt{3}} \frac{1}{1+x^2} dx$

A. A, B, C

B. C, B, A

C. C, A, B

D. A, C, B

Answer: C



Watch Video Solution

148. Match the following :

LIST - I

LIST - II

I) $\int_0^2 |1-x| dx =$

a) 1

II) $\int_0^2 |x-2| dx =$

b) 2

III) $\int_0^2 (|x| + |x-1|) dx =$

c) 3

A. a,b,c

B. b,c,a

C. b,a,c

D. a,c,b

Answer: A



Watch Video Solution

149. If $I_n = \int_0^{\pi/2} x^n \cdot \cos x dx$ then the value of $I_9 + 72I_7 =$

A. $\left(\frac{\pi}{2}\right)^9$

B. $\left(\frac{\pi}{2}\right)^8$

C. $\left(\frac{\pi}{2}\right)^7$

D. 0

Answer: A

[Watch Video Solution](#)

150. $\int_{-\pi/4}^{\pi/4} \left(\frac{x + \pi/4}{2 - \cos 2x} \right) dx =$

A. $\frac{8\pi\sqrt{3}}{5}$

B. $\frac{2\pi\sqrt{3}}{9}$

C. $\frac{4\pi^2\sqrt{3}}{9}$

D. $\frac{\pi^2}{6\sqrt{3}}$

Answer: D

[Watch Video Solution](#)

151. For $x \in \mathbb{R}, x \neq 0$, if $y(x)$ is a differentiable function such that $x \int_1^x y(t) dt = (x + 1) \int_1^x ty(t) dt$, then $y(x)$ equals: (where C is a constant.)

A. $Cx^3 \frac{1}{e^x}$

B. $\frac{C}{x^2} e^{\frac{1}{x}}$

C. $\frac{C}{x} e^{-\frac{1}{x}}$

D. $\frac{C}{x^3} e^{-\frac{1}{x}}$

Answer: D



Watch Video Solution

152. $\lim_{n \rightarrow \infty} \left\{ \frac{1}{n} + \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{3n} \right\} =$

A. $\log 2$

B. $\log 3$

C. $\log 4$

D. $\log 5$

Answer: B



Watch Video Solution

153. $\int_{-2}^3 |1 - x^2| dx =$

A. $\frac{28}{3}$

B. $\frac{14}{3}$

C. $\frac{7}{3}$

D. $\frac{1}{3}$

Answer: A



Watch Video Solution

154. Evaluate

(iii) $\int_0^{\pi} \frac{x \sin^3 x}{1 + \cos^2 x} dx$

A. $\frac{\pi^2}{4}$

B. $\frac{\pi^2}{2}$

C. $\frac{\pi^2}{3}$

D. π^2

Answer: A



Watch Video Solution

155. Match the following

List - 1

List - II

I) $\int_{-1}^1 x|x|dx$

a) $\frac{\pi}{2}$

II) $\int_{\frac{\pi}{2}}^{\pi} \left(1 + \log \left(\frac{4+3\sin x}{4+3\cos x} \right) \right) dx$

b) $\int_{\frac{\pi}{2}}^{\pi} f(x)dx$

III) $\int_0^a f(x)dx$

c) $\int_0^a [f(x) + f(-x)]dx$

IV) $\int_{-a}^a f(x)dx$

d) 0

e) $\int_0^a f(a-x)dx$

A.

I	II	III	IV
d	a	e	c

B.

I	II	III	IV
d	a	c	b

C.

I	II	III	IV
d	c	a	e

D.

I	II	III	IV
a	d	b	d

Answer: A



Watch Video Solution

156. $\int_0^{\pi} \frac{xdx}{4\cos^2x + 9\sin^2x} =$

A. $\frac{\pi^2}{12}$

B. $\frac{\pi^2}{4}$

C. $\frac{\pi^2}{6}$

D. $\frac{\pi^2}{3}$

Answer: A



Watch Video Solution

PRACTICE EXERCISE

$$1. \lim_{n \rightarrow \infty} \sum_{r=0}^{n-1} \frac{1}{n+r} =$$

A. π

B. 0

C. $\log 2$

D. $-\pi$

Answer: C



Watch Video Solution

$$2. \lim_{n \rightarrow \infty} \sum_{r=0}^{n-1} \frac{n}{n^2 + r^2} =$$

A. 1

B. π

C. $\frac{\pi}{2}$

D. $\frac{\pi}{4}$

Answer: D



Watch Video Solution

3. $\lim_{n \rightarrow \infty} \sum_{r=1}^n \frac{1}{\sqrt{4n^2 - r^2}} =$

A. π

B. $\frac{\pi}{2}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{6}$

Answer: D



Watch Video Solution

4. $\lim_{n \rightarrow \infty} \sum_{r=1}^n \frac{r}{n^2 + r^2} =$

A. $\log 2$

B. $\log 4$

C. $\log\sqrt{2}$

D. $\log\sqrt{6}$

Answer: C



Watch Video Solution

5. $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{r=1}^n \sqrt{\frac{r}{n}} =$

A. $\frac{2}{3}$

B. $\frac{3}{4}$

C. $\frac{3}{2}$

D. $\frac{4}{3}$

Answer: A



Watch Video Solution

[Watch Video Solution](#)

6. $\lim_{n \rightarrow \infty} \frac{1}{n^2} \sum_{r=1}^n r \cdot e^{r/n} =$

A. e

B. 1

C. 2e

D. 2

Answer: B

[Watch Video Solution](#)

7. $\lim_{n \rightarrow \infty} \left\{ \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{2n} \right\} =$

A. $\log 3$

B. $2 \log 2$

C. $\log 2$

D. $\frac{\pi}{2}$

Answer: C



Watch Video Solution

8. $\lim_{n \rightarrow \infty} \left\{ \frac{1}{n} + \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{3n} \right\} =$

A. $\log 2$

B. $\log 3$

C. $\log 4$

D. $\log 5$

Answer: B



Watch Video Solution

9. $\lim_{n \rightarrow \infty} \frac{1}{n} \left(\frac{1}{n+1} + \frac{2}{n+2} + \dots + \frac{3}{4n} \right) =$

A. $1 - \log 2$

B. $2 - \log 3$

C. $3 + \log 4$

D. $3 - \log 4$

Answer: D



Watch Video Solution

10. $\lim_{n \rightarrow \infty} \left[\frac{1}{3n+1} + \frac{1}{3n+2} + \dots + \frac{1}{4n} \right] =$

A. $\log \left(\frac{2}{3} \right)$

B. $\log \left(\frac{3}{2} \right)$

C. $\log \left(\frac{4}{3} \right)$

D. $\log\left(\frac{3}{4}\right)$

Answer: C



Watch Video Solution

11. $\lim_{n \rightarrow \infty} \left[\frac{1}{n^3} + \frac{2^2}{n^3} + \dots + \frac{n^2}{n^3} \right] =$

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{2}{3}$

D. $\frac{3}{2}$

Answer: B



Watch Video Solution

12. $\lim_{n \rightarrow \infty} \left(\frac{1 + 8 + 27 + \dots + n^3}{n^4} \right) =$

A. 0

B. $\frac{1}{2}$

C. $\frac{1}{4}$

D. 1

Answer: C



Watch Video Solution

13. $\lim_{n \rightarrow \infty} \frac{1^9 + 2^9 + 3^9 + \dots + n^9}{n^{10}} =$

A. $\frac{1}{2}$

B. $\frac{1}{5}$

C. $\frac{1}{10}$

D. $\frac{1}{15}$

Answer: C



Watch Video Solution

14. $\lim_{n \rightarrow \infty} \left[\frac{1^{99} + 2^{99} + 3^{99} + \dots + n^{99}}{n^{100}} \right]$

A. 100

B. $\frac{1}{99}$

C. $\frac{1}{100}$

D. 99

Answer: C



Watch Video Solution

15. $\lim_{n \rightarrow \infty} \left[\frac{1^2}{n^3 + 1^3} + \frac{2^2}{n^3 + 2^3} + \dots + \frac{1}{2n} \right] =$

A. $\frac{1}{2}\log 2$

B. $\frac{1}{3}\log 3$

C. $\frac{1}{3}\log 2$

D. $\frac{1}{2}\log 3$

Answer: C



Watch Video Solution

16. $\lim_{n \rightarrow \infty} \left[\frac{1}{1+n^2} + \frac{2}{1+n^2} + \dots + \frac{n}{1+n^2} \right]$

A. 1

B. 1/2

C. -1/2

D. -1

Answer: B

[Watch Video Solution](#)

17. $\lim_{n \rightarrow \infty} \frac{\pi}{n} \left(\sin. \frac{\pi}{n} + \sin. \frac{2\pi}{n} + \sin. \frac{3\pi}{n} + \dots + \sin. \frac{(n-1)\pi}{n} \right) =$

A. 0

B. π

C. 2

D. 2π

Answer: C

[Watch Video Solution](#)

18. $\lim_{n \rightarrow \infty} \frac{\pi}{2n} \left(1 + \cos. \frac{\pi}{2n} + \dots + \cos. \frac{(n-1)\pi}{2n} \right) =$

A. -1

B. 1

C. $-\frac{1}{2}$

D. $\frac{1}{2}$

Answer: B



Watch Video Solution

19. Evaluate the following definite integrals as limit of sums :

$$\lim_{n \rightarrow \infty} \frac{1}{n} \left[\tan. \frac{\pi}{4n} + \tan. \frac{2\pi}{4n} + \dots + \tan. \frac{n\pi}{4n} \right]$$

A. $\frac{1}{\pi} \log 2$

B. $\frac{2}{\pi} \log 2$

C. $\pi \log 2$

D. $\frac{\pi}{2} \log 2$

Answer: B



Watch Video Solution

20. Evaluate the limit.

$$\lim_{n \rightarrow \infty} \frac{\sqrt{n+1} + \sqrt{n+2} + \dots + \sqrt{n+n}}{n\sqrt{n}}$$

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{2}{3}$

D. $\frac{3}{2}$

Answer: C



Watch Video Solution

21. $\lim_{n \rightarrow \infty} \left\{ \frac{1}{\sqrt{n^2+1}} + \frac{1}{\sqrt{n^2+2^2}} + \dots + \frac{1}{\sqrt{n^2+n^2}} \right\} =$

A. $\log(\sqrt{2})$

B. $\log(1 + \sqrt{2})$

C. $\sqrt{2}$

D. $2\sqrt{2}$

Answer: B



Watch Video Solution

22. Evaluate the limit.

$$\lim_{n \rightarrow \infty} \frac{\sqrt{n+1} + \sqrt{n+2} + \dots + \sqrt{n+n}}{n\sqrt{n}}$$

A. $\frac{2(2\sqrt{2} - 1)}{3}$

B. $\frac{2\sqrt{2} - 1}{3}$

C. $\frac{2\sqrt{2} + 1}{3}$

D. $\frac{2(2\sqrt{2}) + 1}{3}$

Answer: A



Watch Video Solution

23. Evaluate the following definite integrals as limit of sums :

$$\lim_{n \rightarrow \infty} \left[\left(1 + \frac{1}{n}\right) \left(1 + \frac{2}{n}\right) \dots \left(1 + \frac{n}{n}\right) \right]^{1/n}$$

A. $2e$

B. $2/e$

C. $4/e$

D. $4e$

Answer: C



Watch Video Solution

24. $\int_{\pi/6}^{\pi/4} \frac{dx}{\sin 2x} =$

A. $\frac{1}{2} \ln 3$

B. $\frac{1}{4} \ln 3$

C. $\ln 3$

D. $2\ln 3$

Answer: B



Watch Video Solution

25. $\int_{1/\pi}^{2/\pi} \frac{\sin(1/x)}{x^2} dx =$

A. 1

B. -1

C. $\frac{1}{3}$

D. $\frac{\pi}{2}$

Answer: A



Watch Video Solution

26. $\int_0^1 \frac{4x^3}{\sqrt{1-x^8}} dx =$

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. π

D. $\frac{\pi}{8}$

Answer: B



Watch Video Solution

27. $\int_0^1 \frac{1}{\sqrt{2+3x}} dx =$

A. $\frac{2}{3}(\sqrt{5} + \sqrt{2})$

B. $\frac{2}{3}(\sqrt{5} - \sqrt{2})$

C. $\frac{3}{5}(\sqrt{5} + \sqrt{2})$

D. $2\sqrt{5}$

Answer: B



Watch Video Solution

28. $\int_0^1 \frac{1-x}{1+x} dx =$

A. $2\ln 2 - 1$

B. $\ln 2$

C. $\ln 2 + 1$

D. $2\ln 2 + 1$

Answer: A



Watch Video Solution

29. $\int_0^{\pi/2} \frac{\cos x}{1 + \sin x} dx =$

A. 1

B. 2

C. $\ln 4$

D. $\ln 2$

Answer: D



Watch Video Solution

30. If $f(x) \int_0^k \frac{\cos x}{1 + \sin^2 x} dx = \frac{\pi}{4}$ then $K =$

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. π

D. 2π

Answer: B



Watch Video Solution

31. The solution of $\int_{\sqrt{2}}^x \frac{dt}{t\sqrt{t^2 - 1}} = \frac{\pi}{12}$ is

A. 4

B. 2

C. 6

D. $\sqrt{3}$

Answer: B



Watch Video Solution

32. $\int_0^1 \frac{x^5 dx}{1 + x^4} =$

A. $\frac{2 - \pi}{4}$

B. $\frac{2 + \pi}{4}$

C. $\frac{4 + \pi}{8}$

D. $\frac{4 - \pi}{8}$

Answer: D



Watch Video Solution

33. If $0 < a < c$, $0 < b < c$ then $\int_0^\infty \frac{a^x - b^x}{c^x} dx =$

A. $\ln\left(\frac{b}{c}\right) - \ln\left(\frac{a}{c}\right)$

B. $\frac{\ln a - \ln b}{\ln c}$

C. $\frac{1}{\ln\left(\frac{b}{c}\right)} - \frac{1}{\ln\left(\frac{a}{c}\right)}$

D. 0

Answer: C



Watch Video Solution

34. $\int_0^1 \frac{(\tan^{-1} x)^3}{1+x^2} dx =$

A. $\frac{1}{4} \left(\frac{\pi}{12} \right)^6$

B. $\frac{1}{4} \left(\frac{\pi}{12} \right)^4$

C. $\frac{1}{4} \left(\left(\frac{\pi}{4} \right)^4 - \left(\frac{\pi}{6} \right)^4 \right)$

D. $\left(\frac{\pi}{8} \right)^4$

Answer: C



Watch Video Solution

35. $\int_0^1 e^x \left(x^x + 1 \right)^3 dx =$

A. $\frac{(e + 1)^4}{4}$

B. $\frac{1}{4} \left((e + 1)^4 - 2^4 \right)$

C. $\frac{1}{4} \left((e + 1)^4 - 1 \right)$

D. $\frac{e^4}{4}$

Answer: B

[Watch Video Solution](#)

36. $\int_1^{e^3} \frac{dx}{x\sqrt{1+\ln x}} =$

A. 1

B. 2

C. e

D. 2e

Answer: B

[Watch Video Solution](#)

37. $\int_1^2 x^{-2} \cdot e^{1/x} dx =$

A. $e + \sqrt{e}$

B. $\sqrt{e}$

C. $e - \sqrt{e}$

D. e

Answer: C



Watch Video Solution

38. $\int_0^{\pi} \frac{\sin^3 x}{1 + \cos^2 x} dx =$

A. $\pi - 1$

B. $\pi + 2$

C. $\pi - 2$

D. $2 - \pi$

Answer: C



Watch Video Solution

39. $\int_0^1 \frac{x^3}{(1+x^2)^3} dx =$

A. $\frac{1}{8}$

B. $\frac{1}{4}$

C. $\frac{1}{12}$

D. $\frac{1}{16}$

Answer: D



Watch Video Solution

40. $\int_1^{32} \frac{dx}{x^{1/5} \sqrt{1+x^{4/5}}} =$

A. $\frac{2}{5} (\sqrt{17} + \sqrt{2})$

B. $\frac{2}{5} (\sqrt{17} - \sqrt{2})$

C. $\frac{5}{2} (\sqrt{17} - \sqrt{2})$

D. $\frac{5}{2}(\sqrt{17} + \sqrt{2})$

Answer: C



Watch Video Solution

41. If $I = \int_0^1 \cos \left(2 \cot^{-1} \left(\frac{\sqrt{1-x}}{1+x} \right) \right) dx$ then

A. $\frac{\pi}{2}$

B. $-\frac{\pi}{2}$

C. $\frac{1}{2}$

D. $-\frac{1}{2}$

Answer: D



Watch Video Solution

42. $\int_0^3 x \sqrt{1+x} dx =$

A. $\frac{116}{15}$

B. $\frac{15}{116}$

C. 0

D. $\frac{115}{16}$

Answer: A



Watch Video Solution

43. Evaluate the following integrals

(ix) $\int_0^1 \frac{x}{1 + \sqrt{x}} dx$

A. 0

B. 1

C. $2\left(\frac{5}{6} + \ln 2\right)$

D. $\left(\frac{5}{6} - \ln 2\right)$

Answer: D



Watch Video Solution

44. $\int_{\log 2}^t \frac{dx}{\sqrt{e^x - 1}} = \frac{\pi}{6}$, then $t =$

A. $\ln 8$

B. $\ln 6$

C. $\ln 4$

D. 1

Answer: C



Watch Video Solution

45. $\int_2^3 \frac{2-x}{\sqrt{5x-6-x^2}} dx =$

A. $\frac{\pi}{2}$

B. $-\frac{\pi}{2}$

C. $-\pi$

D. π

Answer: B



Watch Video Solution

46. $\int_1^3 \frac{1}{\sqrt{x+1} - \sqrt{x-1}} dx =$

A. $\frac{4}{3}$

B. $\frac{5}{3}$

C. $\frac{7}{3}$

D. $\frac{8}{3}$

Answer: D



Watch Video Solution

47. $\int_0^{\pi/4} \frac{\sin x + \cos x}{7 + 9\sin 2x} dx =$

A. $\frac{\log 3}{4}$

B. $\frac{\log 3}{36}$

C. $\frac{\log 3}{12}$

D. $\frac{\log 7}{24}$

Answer: D



Watch Video Solution

48. $\int_0^{\pi/2} \frac{1}{9\cos x + 12\sin x} dx =$

A. $\ln 6$

B. $\frac{1}{5} \ln 6$

C. $\frac{1}{15} \ln 6$

D. $\frac{1}{10}\ln 6$

Answer: C



Watch Video Solution

49. Evaluate $\int_0^{\pi/2} \frac{1}{\sin x + \cos x} dx$

A. $\sqrt{2}\ln(\sqrt{2} + 1)$

B. $\frac{1}{\sqrt{2}}\ln(\sqrt{2} + 1)$

C. 1

D. $\ln(\sqrt{2} + 1)$

Answer: A



Watch Video Solution

50. $\int_0^{\pi/2} \frac{dx}{1 + \sin^2 x} =$

A. $\frac{\pi}{2\sqrt{2}}$

B. $\frac{\pi}{\sqrt{2}}$

C. $\frac{\pi}{2}$

D. 0

Answer: A



Watch Video Solution

51. $\int_0^{\pi} \frac{dx}{1 + 2\sin^2 x} =$

A. $\frac{\pi}{3}$

B. $\frac{\pi}{\sqrt{3}}$

C. $\frac{\pi}{2\sqrt{3}}$

D. 4

Answer: B



Watch Video Solution

52. $\int_0^{\pi/2} x^2 \sin x dx =$

A. $\pi - 2$

B. $\pi + 2$

C. $\pi + 4$

D. $\pi - 4$

Answer: A



Watch Video Solution

53. $\int_0^1 \sin^{-1} \sqrt{x} dx =$

A. $\frac{\pi}{2}$

B. $\frac{\pi}{4}$

C. π

D. 2π

Answer: B



Watch Video Solution

54. $\int_0^{1/\sqrt{2}} \frac{\sin^{-1}}{(1-x^2)^{3/2}} dx =$

A. $\frac{\pi}{4} + \ln 2$

B. $\frac{\pi}{4} - \ln 2$

C. $\frac{\pi}{4} - \frac{1}{2} \ln 2$

D. $\ln 2$

Answer: C



Watch Video Solution

55. $\int_1^2 \frac{e^x(1 + x \log x)}{x} dx =$

A. $\ln 2$

B. $e^{2\ln 2}$

C. $2e \ln 2$

D. 1

Answer: B



Watch Video Solution

56. $\int_1^e e^x \left(\frac{x-1}{x^2} \right) dx =$

A. $e^{e-1} - e$

B. e^{e-1}

C. $e^{e-1} + e$

D. e

Answer: A



Watch Video Solution

57. $\int_0^{2\pi} e^{x/2} \sin\left(\frac{x}{2} + \frac{\pi}{4}\right) dx =$

A. 1

B. π

C. 0

D. 2

Answer: C



Watch Video Solution

58. $\int_0^{\pi/2} \left(x \sec^2 \cdot \frac{x}{2} + 2 \tan \cdot \frac{x}{2} \right) dx =$

A. 2π

B. π

C. $\frac{\pi}{2}$

D. $\frac{\pi}{4}$

Answer: B



Watch Video Solution

59. If $f(x) = \int_0^x t \cdot e^t dt$ then $f'(-1) =$

A. e

B. $\frac{1}{e}$

C. $-\frac{1}{e}$

D. $-e$

Answer: C



Watch Video Solution

60. If $y = \int_0^x \frac{t^2}{\sqrt{t^2 + 1}} dt$ then $\frac{dy}{dx}$ at $x = 1$ is

A. $\sqrt{2}$

B. $\frac{1}{2}$

C. $\frac{1}{\sqrt{2}}$

D. 2

Answer: C



Watch Video Solution

61. If $\int_0^x f(t) dt = x + \int_x^1 t f(t) dt$, then the value of $f(1)$ is

A. 0

B. 1

C. -1

D. $\frac{1}{2}$

Answer: D



Watch Video Solution

62. Equation of the tangent line to the curve $y = \int_0^x \cos \theta d\theta$ at $x = \frac{\pi}{2}$ is

A. $x = 0$

B. $y = 0$

C. $x = 1$

D. $y = 1$

Answer: D



Watch Video Solution

63. $\frac{d}{dx}F(x) = \frac{e^{\sin x}}{x}, x > 0$. If $\int_1^4 \frac{2e^{\sin x^2}}{x} dx = F(K) - F(1)$, then one of the possible values of K is :

A. 4

B. -4

C. 16

D. 8

Answer: C



Watch Video Solution

64. If $f(x) = \begin{vmatrix} \cos x & 1 & 0 \\ 1 & 2\cos x & 1 \\ 0 & 1 & 2\cos x \end{vmatrix}$ then $\int_0^{\pi/2} f(x) dx =$

A. $\frac{1}{2}$

B. $-\frac{1}{2}$

C. $-\frac{1}{3}$

D. $\frac{1}{3}$

Answer: C

[Watch Video Solution](#)

65. $\int_0^{\frac{\pi}{2n}} \frac{dx}{1 + \cot^n nx} =$

A. $\frac{\pi}{2n}$

B. $\frac{\pi}{4n}$

C. $\frac{\pi}{8n}$

D. $\frac{\pi}{n}$

Answer: B

[Watch Video Solution](#)

66. By using the properties of definite integrals, evaluate the integrals

$$\int_0^{\frac{\pi}{4}} \log(1 + \tan x) dx$$

A. $\frac{\pi}{8} \ln 2$

B. $\frac{\pi}{n}\ln 2$

C. $\pi\ln 2$

D. $\frac{\pi}{2}\ln 2$

Answer: A



Watch Video Solution

67. If $\int_0^{\pi/2} \ln(\sin x) dx = -\frac{\pi}{2}\ln 2$ then $\int_0^{\pi} \ln(1 + \cos x) dx =$

A. $\pi\ln 2$

B. $-\pi\ln 2$

C. $\frac{\pi}{2}\ln 2$

D. $\ln 2$

Answer: B



Watch Video Solution

68. $\int_0^{\infty} \frac{\log(1+x^2)}{1+x^2} dx =$

A. $\ln 2$

B. $\frac{\pi}{2} \ln 2$

C. $\pi \ln 2$

D. $\frac{\pi}{4} \ln 2$

Answer: C



Watch Video Solution

69. $\int_0^1 \ln \sin\left(\frac{\pi x}{2}\right) dx =$

A. $\ln 2$

B. $-\ln 2$

C. $\ln 4$

D. 1

Answer: B



Watch Video Solution

70. If $\int_0^{\pi/2} \sin^4 x \cos^2 x dx = \frac{\pi}{32}$ then $\int_0^{\pi/2} \cos^4 x \sin^2 x dx =$

A. 0

B. 1

C. $\frac{\pi}{32}$

D. $\frac{\pi}{16}$

Answer: C



Watch Video Solution

71. $\int_0^{\pi/2} \sin 2x \cdot \ln(\tan x) dx$

A. 1

B. -1

C. 0

D. $\frac{\pi}{4}$

Answer: C



Watch Video Solution

72. $\int_0^{\pi/2} \ln\left(\frac{4 + 3\sin x}{4 + 3\cos x}\right) dx =$

A. 1

B. 0

C. $\frac{\pi}{4}$

D. -1

Answer: B



Watch Video Solution

73. $\int_0^1 x(1-x)^{10} dx =$

A. $\frac{1}{112}$

B. $\frac{1}{132}$

C. $\frac{1}{246}$

D. $\frac{1}{92}$

Answer: B



Watch Video Solution

74. If $f(x)$ and $g(x)$ are continuous functions satisfying

$f(x) = f(a-x)$ and $g(x) + g(a-x) = 2$ then $\int_0^a f(x)g(x)dx =$

A. $2\int_0^a f(x)dx$

B. $\int_0^a f(x)dx$

C. $2\int_0^a g(x)dx$

D. $\int_0^a g(x)dx$

Answer: B



Watch Video Solution

75. $\int_0^{\infty} \frac{x}{(1+x)(1+x^2)} dx =$

A. $\frac{\pi}{4}$

B. π

C. $\frac{\pi}{2}$

D. 2π

Answer: A



Watch Video Solution

76. $\int_{-1}^1 \frac{\cosh x}{1 + e^{2x}} dx =$

A. $\frac{e^2}{2}$

B. $\frac{e^2 - 1}{2}$

C. $\frac{e^2 - 1}{2e}$

D. $1 - e^2$

Answer: C



Watch Video Solution

77. Evaluate the definite integrals .

$$\int_{-\pi/2}^{\pi/2} \frac{\cos x}{1 + e^x} dx$$

A. 0

B. -1

C. 1

D. 2π

Answer: C



Watch Video Solution

78. $\int_0^{\pi} \frac{1}{1 + 3^{\cos x}} dx =$

A. π

B. $-\pi$

C. $\frac{\pi}{2}$

D. 2π

Answer: C



Watch Video Solution

79. $\int_4^{10} \frac{\left[x^2 \right] dx}{\left[x^2 - 28x + 196 \right] + \left[x^2 \right]},$

A. $\frac{1}{3}$

B. 6

C. 7

D. 3

Answer: D



Watch Video Solution

80. $\int_0^{\infty} e^{-x \log 2} dx =$

A. $\ln 2$

B. $\frac{1}{\ln 2}$

C. 1

D. 0

Answer: B



Watch Video Solution

81. Evaluate the integral

$$\int_0^1 \sin^{-1} \left(\frac{2x}{1+x^2} \right) dx$$

A. $\frac{\pi}{2}$

B. $\frac{\pi}{2} + \ln 2$

C. $\frac{\pi}{2} - \ln 2$

D. $\ln 2$

Answer: C



Watch Video Solution

82. $\int_0^1 (x-1)e^{-x} dx =$

A. $-\frac{1}{e}$

B. $\frac{1}{e}$

C. e

D. $2e$

Answer: A



Watch Video Solution

83. $\int_1^e \frac{\ln x}{x^2} dx =$

A. $1 - \frac{2}{e}$

B. $\frac{2}{e}$

C. $\frac{2}{e} + 1$

D. $\frac{e}{2} - 1$

Answer: A



Watch Video Solution

84. $\int_0^{\pi/2} \frac{\cos^{3/2} x}{\cos^{3/2} x + \sin^{3/2} x} dx =$

A. π

B. $\frac{3\pi}{2}$

C. $\pi - \frac{\pi}{6}$

D. $\frac{\pi}{4}$

Answer: D



Watch Video Solution

85. $\int_0^{\pi/2} \frac{3\sec x + 5\operatorname{cosec} x}{\sec x + \operatorname{cosec} x} dx =$

A. π

B. 4π

C. 6π

D. 2π

Answer: D



Watch Video Solution

86. Evaluate the following integrals

(i) $\int_0^{\frac{\pi}{2}} \frac{\sin^2 x - \cos^2 x}{\sin^3 x + \cos^3 x} dx$

A. 0

B. 1

C. $\frac{\pi}{4}$

D. -1

Answer: A



Watch Video Solution

87. $\int_0^5 x(5-x)^{10} dx =$

A. $\frac{5^{12}}{132}$

B. $\frac{5^{10}}{132}$

C. $\frac{1}{132}$

D. $\frac{5}{132}$

Answer: A



Watch Video Solution

88. $\int_0^1 \frac{x}{(1-x)^{5/4}} dx =$

A. $\frac{16}{3}$

B. $-\frac{16}{3}$

C. $\frac{3}{16}$

D. $-\frac{3}{16}$

Answer: B



Watch Video Solution

89. $\int_1^3 \frac{\sqrt{3}}{\sqrt{4-x} + \sqrt{x}} dx =$

A. 1

B. $\frac{1}{2}$

C. 2

D. 0

Answer: A



Watch Video Solution

90. $\int_{\pi/6}^{\pi/3} \frac{\sin^3 x}{\sin^3 x + \cos^3 x} dx =$

A. $\frac{\pi}{16}$

B. $\frac{\pi}{12}$

C. $\frac{\pi}{2}$

D. 2π

Answer: B



Watch Video Solution

91. $\int_{-2\pi}^{2\pi} \sin^5 x dx =$

A. 0

B. $\frac{3\pi}{16}$

C. $\frac{8}{15}$

D. $\frac{27}{16}$

Answer: A



Watch Video Solution

92. $\int_{-\pi}^{\pi} x^3 \cos x dx =$

A. 1

B. 0

C. -1

D. π

Answer: B



Watch Video Solution

93. $\int_{-\pi}^{\pi} x^4 \sin x dx =$

A. 0

B. 2π

C. $\frac{3}{2}$

D. 1

Answer: A



Watch Video Solution

94. $\int_{-\pi}^{\pi} \frac{x \cos x}{1 + \sin^2 x} dx =$

A. 1

B. 0

C. -1

D. $\frac{1}{2}$

Answer: B



Watch Video Solution

95. $\int_{-1}^1 \sin^{-1} \left(\frac{x}{1+x^2} \right) dx =$

A. $\frac{\pi}{4}$

B. 0

C. 4

D. $\frac{\pi}{2}$

Answer: B



Watch Video Solution

96. $\int_{-\pi}^{\pi} (\cos ax - \sin ax)^2 dx =$

A. 0

B. π

C. 2π

D. 4π

Answer: C



Watch Video Solution

97. $\int_{-\pi/2}^{\pi/2} \cos \theta (1 + \sin \theta)^2 d\theta =$

A. $\frac{14}{3}$

B. $\frac{8}{3}$

C. $\frac{5}{14}$

D. 0

Answer: B



Watch Video Solution

98. $\int_{-\pi/2}^{\pi/2} \sin^2 x \cos^2 x (\sin x + \cos x) dx =$

A. 0

B. $\frac{11}{4}$

C. $\frac{15}{4}$

D. $\frac{4}{15}$

Answer: D



Watch Video Solution

99. If $f(x) = \begin{cases} x & \text{for } x < 1 \\ x - 1 & \text{for } x \geq 1 \end{cases}$ then $\int_0^2 x^2 f(x) dx =$

A. $\frac{5}{3}$

B. $\frac{3}{5}$

C. $-\frac{5}{3}$

D. $-\frac{3}{5}$

Answer: A



Watch Video Solution

100. If $\int_n^{n+1} f(x) dx = n^2 + n, \forall n \in I$ then the value of $\int_{-3}^3 f(x) dx$ is equal to

A. 6

B. 10

C. 16

D. 12

Answer: C



Watch Video Solution

101. $\int_0^{\pi} \frac{\tan x}{\sec x + \cos x} dx =$

A. π

B. $\frac{\pi}{4}$

C. $\frac{\pi}{2}$

D. 2π

Answer: C



Watch Video Solution

102. For $m = n$ and $m, n \in N$ then the value of $\int_0^{\pi} \cos mx \cos nx dx =$

A. 0

B. $\frac{\pi}{2}$

C. π

D. 1

Answer: B



Watch Video Solution

103. If n is an integer then the value of $\int_0^{\pi} e^{\cos^2 x} \cos^3((2n+1)x) dx =$

A. 1

B. 0

C. -1

D. $\frac{1}{2}$

Answer: B



Watch Video Solution

104. $\int_0^{\pi} \frac{x \tan x}{\sec x + \tan x} dx =$

A. $\frac{\pi}{2} + 1$

B. $\frac{\pi}{2} - 1$

C. $\pi \left(\frac{\pi}{2} - 1 \right)$

D. $\pi \left(\frac{\pi}{2} + 1 \right)$

Answer: C



Watch Video Solution

105. $\int_0^{\pi} x f(\sin x) dx$ is equal to

A. $\pi \int_0^{\pi} f(\cos x) dx$

B. $\pi \int_0^{\pi} f(\sin x) dx$

C. $\frac{\pi}{2} \int_0^{\frac{\pi}{2}} f(\sin x) dx$

D. $\pi \int_0^{\frac{\pi}{2}} f(\cos x) dx$

Answer: D



Watch Video Solution

106. $\int_0^{\pi/4} \left[\sqrt{\frac{1 - \sin 2x}{1 + \sin 2x}} \right] dx =$

A. $\frac{1}{2} \ln 2$

B. $-\frac{1}{2} \ln 2$

C. $\ln 2$

D. $-\ln 2$

Answer: A



Watch Video Solution

107. $\int_{-1}^1 \log\left(\frac{2+x}{2-x}\right) dx =$

- A. 1
- B. $\ln 3$
- C. 0
- D. $\ln 4$

Answer: C



Watch Video Solution

108. $\int_{-1}^1 \left(x^{27} \cos x + e^x\right) dx =$

- A. 0
- B. 1
- C. $e + \frac{1}{e}$
- D. $e - \frac{1}{e}$

Answer: D



Watch Video Solution

109. $\int_{-\pi/2}^{\pi/2} \cos x \cdot \sinh x dx =$

A. 1

B. -1

C. 0

D. $\frac{1}{2}$

Answer: C



Watch Video Solution

110. $\int_0^{\pi} \cos^5 x dx =$

A. 1

B. 0

C. $1/7$

D. π

Answer: B



Watch Video Solution

111. $\int_0^{2\pi} \sin^7 x dx =$

A. 0

B. 1

C. 2

D. 3

Answer: A



Watch Video Solution

112. Find the value of $\int_0^{\pi} \frac{x}{1 + \sin x} dx$

A. $\frac{\pi}{2}$

B. π

C. 2π

D. 4π

Answer: B



Watch Video Solution

113. $\int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx =$

A. $\frac{\pi^2}{4}$

B. $\frac{\pi}{4}$

C. $\frac{\pi^2}{2}$

D. $\frac{\pi}{2}$

Answer: A



Watch Video Solution

114. If $0 < a < b$, then $\int_a^b \frac{|x|}{x} dx =$

A. $a - b$

B. $b - a$

C. $a + b$

D. 0

Answer: B



Watch Video Solution

115. $\int_0^2 |1 - x| dx$

A. 0

B. 1

C. $\frac{1}{2}$

D. $-\frac{1}{2}$

Answer: B



Watch Video Solution

116. $\int_0^{\pi} \sqrt{\frac{1 + \cos 2x}{2}} dx =$

A. 1

B. 2

C. $\sqrt{2}$

D. 0

Answer: B



Watch Video Solution

117. $\int_0^7 [x] dx =$

A. 21

B. 20

C. 22

D. 23

Answer: A



Watch Video Solution

118. $\int_{-1}^1 (x - [x]) dx =$

A. 0

B. 1

C. -1

D. 2

Answer: B



Watch Video Solution

119. $\int_0^{2\pi} \frac{\sqrt{1 - \cos 2x}}{2} dx =$

A. 4

B. 2

C. 8

D. 6

Answer: A



Watch Video Solution

120. $\int_a^b (|x - a| + |x - b|) dx (0 < a < b) =$

A. $(b - a)^2$

B. $(b - a)$

C. $b + a$

D. $(b + a)^2$

Answer: A



Watch Video Solution

121. Evaluate $\int_{-\pi/2}^{\pi/2} \sin|x| dx$

A. 0

B. 1

C. 2

D. 4

Answer: C



Watch Video Solution

122. $\int_0^{\pi/3} |\tan x - 1| dx =$

A. $\frac{\pi}{2}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{6}$

D. $\frac{\pi}{2}$

Answer: C



Watch Video Solution

123. If $f(x) = \int_{-1}^x |t| dt$ then for any $x \geq 0$, $f(x) =$

A. $\frac{1}{2}(1 - x^2)$

B. $(1 - x^2)$

C. $\frac{1}{2}(1 + x^2)$

D. $1 + x^2$

Answer: C



Watch Video Solution

124. If $[x]$ denotes the greatest integer function then the value of

$$\int_{0.5}^{4.5} [x] dx + \int_{-1}^1 |x| dx \text{ is}$$

A. 9

B. 8

C. 7

D. 6

Answer: A



Watch Video Solution

125. Evaluate $\int_0^2 [x^2] dx$ where $[]$ denotes the GIF

A. 0

B. $5 - \sqrt{2} - \sqrt{3}$

C. $5 + \sqrt{2} + \sqrt{3}$

D. $\sqrt{2} + \sqrt{3} + \sqrt{5}$

Answer: B



Watch Video Solution

126. The value of $\int_{-10}^{10} \frac{3^x}{3^{[x]}} dx$ is equal to

A. 20

B. $\frac{40}{\ln 3}$

C. $\frac{20}{\ln 3}$

D. $\frac{60}{\ln 3}$

Answer: B



Watch Video Solution

127. $\int_0^{[x]} (x - [x]) dx =$

A. $\frac{[x]}{2}$

B. $1 + \frac{[x]}{2}$

C. $[x]$

D. $2[x]$

Answer: A



Watch Video Solution

128. If $\int_0^{\pi/2} \sin^6 x dx = \frac{\pi}{32}$ then $\int_{-\pi}^{\pi} (\sin^6 x + \cos^6 x) dx =$

A. $\frac{5\pi}{8}$

B. $\frac{5\pi}{16}$

C. $\frac{5\pi}{32}$

D. $\frac{5\pi}{4}$

Answer: D



Watch Video Solution

129. $\int_0^{\pi} \sin^7 x dx =$

A. $\frac{2\pi}{35}$

B. $\frac{32}{35}$

C. $\frac{34}{35}$

D. $\frac{17}{35}$

Answer: B



Watch Video Solution

130. $\int_0^{\pi/8} \cos^6 4x dx =$

A. $\frac{5\pi}{128}$

B. $\frac{35\pi}{128}$

C. $\frac{25\pi}{128}$

D. $\frac{5}{128}$

Answer: A



Watch Video Solution

131. $\int_0^{\pi} \cos^8 x dx =$

A. $\frac{5\pi}{16}$

B. $\frac{35\pi}{128}$

C. $\frac{5\pi}{18}$

D. $\frac{5\pi}{8}$

Answer: B



Watch Video Solution

132. $\int_0^{\pi/4} \tan^6 x dx =$

A. $\frac{\pi}{4} + \frac{3}{15}$

B. $\frac{\pi}{4} + \frac{2}{3}$

C. $\frac{13}{15} - \frac{\pi}{4}$

D. $\frac{\pi}{4} - \frac{13}{15}$

Answer: C



Watch Video Solution

133. If $I_n = \int_0^{\pi/4} \tan^n x dx$ then $\frac{1}{I_3 + I_5} =$

A. $\frac{1}{4}$

B. $\frac{1}{2}$

C. $\frac{1}{8}$

D. 4

Answer: D



Watch Video Solution

134. Find the values of the following integrals

(iv) $\int_0^{\frac{\pi}{4}} \sec^3 x dx$

A. $\frac{1}{2} \ln 2$

B. $\frac{1}{\sqrt{2}} + \frac{1}{2} \ln(\sqrt{2} + 1)$

C. $\frac{1}{\sqrt{2}} - \ln(\sqrt{2} + 1)$

D. $\ln(\sqrt{2} + 1)$

Answer: B



Watch Video Solution

135. Find the values of the following integrals

(ii) $\int_0^{\pi} \cos^3 x \sin^4 x dx$

A. 0

B. 1

C. 16

D. $\frac{3\pi}{16}$

Answer: A



Watch Video Solution

136. $\int_0^{2\pi} \cos^7 x \sin^5 x dx =$

A. 1

B. 0

C. $\frac{5\pi}{16}$

D. $\frac{3\pi}{8}$

Answer: B



Watch Video Solution

137. $\lim_{x \rightarrow 0} \frac{\int_0^x \sin^3 t dt}{x^4} =$

A. 0.25

B. 2.5

C. 5.2

D. 0.52

Answer: A



Watch Video Solution

138. $\lim_{x \rightarrow 0} \left(\frac{\int_0^x \cos^3 t dt}{x} \right) =$

A. 0

B. $\frac{1}{2}$

C. 1

D. 2

Answer: C



Watch Video Solution

139. $\int_0^1 \frac{x^6}{\sqrt{1-x^2}} dx =$

A. $\frac{5\pi}{32}$

B. $\frac{5\pi}{64}$

C. $\frac{5\pi}{16}$

D. $\frac{3\pi}{32}$

Answer: A



Watch Video Solution

140. $\int_0^a (a^2 - x^2)^{5/2} dx =$

A. $\frac{\pi a^2}{2}$

B. $\frac{\pi a^2}{4}$

C. $\frac{2\pi a^2}{3}$

D. $\frac{\pi a}{4}$

Answer: B



Watch Video Solution

141. $\int_0^{2a} \sqrt{2ax - x^2} dx =$

A. $\frac{\pi a^2}{2}$

B. $\frac{\pi a^2}{4}$

C. $\frac{2\pi a^2}{3}$

D. $\frac{\pi a}{4}$

Answer: A



Watch Video Solution

142. $\int_0^{\infty} \frac{dx}{(1+x^2)^4} =$

A. $\frac{3\pi}{26}$

B. $\frac{7\pi}{28}$

C. $\frac{5\pi}{32}$

D. $\frac{9\pi}{24}$

Answer: C



Watch Video Solution

143. $\int_0^{\pi/4} \left(\tan^n(x - [x]) + \tan^{n-2}(x - [x]) \right) dx$

A. $\frac{2}{n+1}$

B. $\frac{1}{n+1}$

C. $\frac{2}{n-1}$

D. $\frac{1}{n-1}$

Answer: D



Watch Video Solution

144. $\int_0^{2\pi} x \cos^6 x dx =$

A. $\frac{3\pi^2}{16}$

B. $\frac{3\pi}{8}$

C. $\frac{5\pi^2}{8}$

D. $\frac{5\pi^2}{16}$

Answer: C



Watch Video Solution

145. $\int_0^{2\pi} x \sin^4 x \cos^6 x dx =$

A. 0

B. $\frac{3\pi^2}{128}$

C. $\frac{5\pi^2}{128}$

D. $\frac{3\pi^2}{64}$

Answer: B



Watch Video Solution

146. If $I_n = \int_1^e (\log x)^n dx$ then $I_8 + 8I_7 =$

A. 1

B. e

C. 2

D. $2e$

Answer: B



Watch Video Solution

147. If $f(x) = Ax^2 + Bx$ satisfies the conditions $f^1(1) = 8$ and $\int_0^1 f(x)dx = \frac{8}{3}$, then

A. $A = 1, B = -4$

B. $A = 2, B = 4$

C. $A = -2, B = 4$

D. $A = -2, B = -4$

Answer: B



Watch Video Solution

148. If $I_1 = \int_x^1 \frac{1}{1+t^2} dt$ and $I_2 = \int_1^{\frac{1}{x}} \frac{1}{1+t^2} dt$ for $x > 0$, then

A. $I_1 = I_2$

B. $I_1 > I_2$

C. $I_1 < I_2$

D. Cannot be determined

Answer: A



Watch Video Solution

149. If $I_1 = \int_e^{e^2} \frac{dx}{\log x}$ and $I_2 = \int_1^2 \frac{e^x}{x} dx$, then

A. $I_1 = I_2$

B. $2I_1 = I_2$

C. $I_1 = 2I_2$

D. $I_1 I_2 = 1$

Answer: A



Watch Video Solution

150. If $I = \int_0^1 \sqrt{1+x^3} dx$ then

A. $I > 1$

B. $I \neq \frac{\sqrt{5}}{2}$

C. $1 > \frac{\sqrt{7}}{2}$

D. $I = 0$

Answer: A



Watch Video Solution

151. $\lim_{x \rightarrow 0} \int_0^{x^2} \frac{\sin \sqrt{t} dt}{x^3} =$

A. $\frac{1}{3}$

B. $\frac{2}{3}$

C. $\frac{4}{3}$

D. 0

Answer: B



Watch Video Solution

Examples

1. Evaluate $\int_0^{\pi} \sin x \, dx$



Watch Video Solution

2. Evaluate $\int_0^a \frac{dx}{x^2 + a^2}$



Watch Video Solution

3. Evaluate $\int_1^2 \frac{(x+1)^3}{x^2} dx$



Watch Video Solution

4. Evaluate (i) $\int_0^4 |2-x| dx$ (ii) $\int_a^b \frac{|x|}{x} dx$



Watch Video Solution

5. Evaluate $\int_1^4 x \sqrt{x^2 - 1} dx$



Watch Video Solution

6. Evaluate $\int_0^a \sqrt{a^2 - x^2} dx$



Watch Video Solution

7. Evaluate the following integrals

$$\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{9 + 16\sin 2x} dx$$



Watch Video Solution

8. Evaluate the integrals .

$$\int_0^{\pi/2} x^2 \sin x dx$$



Watch Video Solution

Exercise - 2.1 (Level-1)

1. Evaluate the following integrals using the definition of a definite integral as the limit of a sum.

$$\int_1^2 x dx$$



View Text Solution

2. Evaluate the following integrals using the definition of a definite integral as the limit of a sum.

$$\int_a^b x^2 dx$$



View Text Solution

3. Evaluate the following integrals using the definition of a definite integral as the limit of a sum.

$$\int_1^2 x^3 dx$$



View Text Solution

4. Evaluate the following integrals using the definition of a definite integral as the limit of a sum.

$$\int_2^3 x^3 dx$$



View Text Solution

5. Evaluate the following integrals using the definition of a definite integral as the limit of a sum.

$$\int_0^{\frac{\pi}{2}} \cos x dx$$



[View Text Solution](#)

6. Evaluate the following integrals using the definition of a definite integral as the limit of a sum.

$$\int_0^1 e^x dx$$



[Watch Video Solution](#)

Exercise 2.2 (Level-1)

1. Evaluate the following integrals

$$\int_1^2 x^5 dx$$



[Watch Video Solution](#)

2. Evaluate the definite integrals .

$$\int_0^a (a^2x - x^3) dx$$



Watch Video Solution

3. Evaluate the following integrals

$$(iii) \int_2^3 \frac{2x}{1+x^2} dx$$



Watch Video Solution

4. Evaluate the following integrals

$$(iv) \int_0^4 \frac{x^2}{1+x} dx$$



Watch Video Solution

5. Evaluate the following integrals

$$(v) \int_0^a (\sqrt{a} - \sqrt{x})^2 dx$$

[Watch Video Solution](#)

6. Evaluate the following integrals

(vi) $\int_0^1 \frac{1}{\sqrt{x+1} + \sqrt{x}} dx$

[Watch Video Solution](#)

7. Evaluate the following integrals

$\int_0^1 \frac{x^2}{1+x^2} dx$

[Watch Video Solution](#)

8. Evaluate the following integrals

(viii) $\int_0^3 \frac{xdx}{\sqrt{x^2+16}}$

[Watch Video Solution](#)

9. Evaluate the following integrals

$$\int_0^2 \sqrt{4 - x^2} dx$$



Watch Video Solution

10. Evaluate the following integrals

$$(x) \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \cot^2 x dx$$



Watch Video Solution

11. Evaluate the definite integrals .

$$\int_0^{\pi} \sqrt{2 + 2\cos\theta} d\theta$$



Watch Video Solution

$$12. \int_0^2 |1 - x| dx$$



Watch Video Solution

13. Evaluate the following integrals

(iii) $\int_0^{\frac{\pi}{4}} \frac{1 + \sin 2x}{\cos x + \sin x} dx$



Watch Video Solution

14. Evaluate $\int_1^4 x \sqrt{x^2 - 1} dx$



Watch Video Solution

15. Evaluate the definite integrals .

$$\int_0^1 \frac{dx}{\sqrt{3 - 2x}}$$



Watch Video Solution

16. Evaluate the definite integrals .

$$I = \int_1^5 \frac{dx}{\sqrt{2x-1}}$$



Watch Video Solution

17. Evaluate $\int_0^{16} \frac{x^{1/4}}{1+x^{1/2}} dx$



Watch Video Solution

18. $\int_0^1 (2x+3)(\sqrt{3-2x}) dx$



Watch Video Solution

19. $\int_0^1 x e^{-x^2} dx$



Watch Video Solution

20. Evaluate the integrals .

$$\int_{-1}^2 \frac{x^2}{x^2 + 2} dx$$



Watch Video Solution

21. Evaluate the following integrals

(i) $\int_0^{\frac{\pi}{2}} x \cos x dx$



Watch Video Solution

22. $\int_0^{\sqrt{e}} x \log x dx$



Watch Video Solution

23. Evaluate the following integrals

(iii) $\int_1^2 \frac{\log x}{x^2} dx$



Watch Video Solution

24. $\int_0^1 \frac{xe^x}{(x+1)^2} dx =$



Watch Video Solution

25. $\int_0^{\frac{\pi}{2}} x^2 \sin x dx$



Watch Video Solution

26. $\int_1^2 x^2 \log x dx$



View Text Solution

27. Evaluate the following integrals

(v) $\int_0^1 \sin^{-1} x dx$



Watch Video Solution

28. Evaluate the integrals by using substitution

$$\int_0^1 \sin^{-1} \left(\frac{2x}{1+x^2} \right) dx$$



Watch Video Solution

29. Evaluate the following integrals

(ii) $\int_0^1 x^2 \sin^{-1} x dx$



Watch Video Solution

30. Evaluate the following integrals

(iii) $\int_0^{\frac{\pi}{2}} \frac{1}{4+5\cos x} dx$



Watch Video Solution

31. Evaluate the following integrals

(iv) $\int_0^1 \sqrt{\frac{1-x}{1+x}} dx$



Watch Video Solution

32. Find $\int_a^b \sqrt{(x-a)(b-x)} dx$



Watch Video Solution

33. Evaluate the following integrals

(v) $\int_0^1 x \tan^{-1} x dx$



Watch Video Solution

34. Evaluate the following integrals

(vi) $\int_0^{1/2} \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx$



[Watch Video Solution](#)

35. $a > 0, \int_{-\pi}^{\pi} \frac{\sin^2 x}{1 + a^x} dx =$

[Watch Video Solution](#)

Exercise-2.3 (Level-1)

1. Evaluate the integrals .

$$\int_0^{\pi/2} \frac{\sin^2 x - \cos^2 x}{\sin^3 x + \cos^3 x} dx$$

[Watch Video Solution](#)

2. Evaluate the definite integrals .

$$\int_0^{\pi} \sin^3 x \cdot \cos^3 x dx$$

[Watch Video Solution](#)

3. Evaluate the following integrals

$$\int_0^{\frac{\pi}{2}} \log(\tan x) dx$$



Watch Video Solution

4. Evaluate the following integrals

$$\int_0^{2\pi} \cos x dx$$



Watch Video Solution

5. Evaluate the following integrals

(i) $\int_{-1}^1 \log\left(\frac{2-x}{2+x}\right) dx$



Watch Video Solution

6. $\int_{-1}^1 \frac{x^2 \sin^{-1} x}{\sqrt{1-x^2}} dx$

[Watch Video Solution](#)

7. $\int_{-a}^a \left[\sqrt{k+x+x^2} - \sqrt{k-x+x^2} \right] dx$

[Watch Video Solution](#)

8. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left(\sin^{2009} x + x^{1009} \right) dx$

[Watch Video Solution](#)

9. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (f(x) + f(-x))(g(x) - g(-x)) dx$ where $f(x)$ and $g(x)$ are continuous functions on $\left[-\frac{\pi}{2}, \frac{\pi}{2} \right]$

[Watch Video Solution](#)

10. Evaluate the following integrals

(i) $\int_0^{\frac{\pi}{2}} \frac{\cos^{5/2} x}{\sin^{5/2} x + \cos^{5/2} x} dx$



Watch Video Solution

11. $\int_0^{\frac{\pi}{2}} \frac{1}{1 + \cot x} dx$



Watch Video Solution

12. Evaluate the following integrals

(iii) $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sec x}}{\sqrt{\sec x} + \sqrt{\csc x}} dx$



Watch Video Solution

13. $\int_0^{\frac{\pi}{2}} \frac{4\sqrt{\cot x}}{4\sqrt{\tan x} + 4\sqrt{\cot x}} dx$



Watch Video Solution

14. Evaluate the following integrals

(i) $\int_0^{\frac{\pi}{2}} \frac{2\sin x + 3\cos x}{\sin x + \cos x} dx$



Watch Video Solution

15. $\int_0^{\frac{\pi}{2}} \frac{3\tan x + 4\cot x}{\tan x + \cot x} dx$



Watch Video Solution

16. $\int_0^{\frac{\pi}{2}} \frac{4 \sec x + 5 \operatorname{cosec} x}{\sec x + \operatorname{cosec} x} dx$



Watch Video Solution

17. $\int_0^{\frac{\pi}{2}} \frac{2\cos x - \sin x}{\cos x + \sin x} dx$



Watch Video Solution

18. Evaluate $\int_{\pi/6}^{\pi/3} \frac{\sqrt{x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$



Watch Video Solution

19. Evaluate the following integrals

(ii) $\int_{\frac{\pi}{6}}^{\frac{3}{\pi}} \frac{1}{1 + \sqrt[3]{\tan x}} dx$



Watch Video Solution

20. $\int_{\frac{\pi}{6}}^{\frac{3}{\pi}} \frac{\sec^4 x}{\operatorname{cosec}^4 x + \sec^4 x} dx$



Watch Video Solution

21. $\int_{\frac{\pi}{5}}^{\frac{3\pi}{10}} \frac{f(\sin x)}{f(\sin x) + f(\cos x)} dx$



Watch Video Solution

22. Find $\int -a \left(x^2 + \sqrt{a^2 - x^2} \right) dx$



Watch Video Solution

23. Evaluate $\int_{-\pi/2}^{\pi/2} \sin|x| dx$



Watch Video Solution

24. Evaluate the following integrals

(iii) $\int_{-1}^1 |x| dx$



Watch Video Solution

25. $\int_{\pi}^{\pi/2} \sin|2x| dx$



Watch Video Solution

26. Evaluate the following integrals

(iv) $\int_{-1}^1 (x^4 + \sin^3 x) dx$



Watch Video Solution

27. Evaluate the definite integrals .

$\int_{-\pi/2}^{\pi/2} \frac{\cos x}{1 + e^x} dx$



Watch Video Solution

28. $\int_0^{2\pi} \frac{1}{1 + e^{\sin x}} dx =$



Watch Video Solution

29. $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{dx}{1 + e^{\tan x}}$



Watch Video Solution

 Watch Video Solution

30. $\int_{-1}^1 \frac{\cosh x}{1 + e^{2x}} dx =$



Watch Video Solution

31. Show that $\int_0^a x(a - x)^n dx = \frac{a^{n+2}}{(n + 1)(n + 2)}$.

Hence find $\int_0^2 x\sqrt{2 - x} dx$



Watch Video Solution

32. Evaluate the integral

$\int_0^{\pi/4} \log(1 + \tan x) dx$



Watch Video Solution

33. Evaluate the integral

$$\int_0^1 \frac{\log(1+x)}{1+x^2} dx$$



Watch Video Solution

34. Evaluate

$$(i) \int_0^{\frac{\pi}{2}} \frac{\sin^2 x}{\sin x + \cos x} dx$$



Watch Video Solution

$$35. \int_0^{(\pi/2)} \frac{x dx}{\sin x + \cos x} =$$



Watch Video Solution

36. Evaluate

$$(i) \int_0^{\pi} \frac{x \sin x}{1 + \sin x} dx$$



Watch Video Solution

 Watch Video Solution

37. Evaluate the integral

$$\int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx$$



Watch Video Solution

38. Evaluate

(iii) $\int_0^{\pi} \frac{x \sin^3 x}{1 + \cos^2 x} dx$



Watch Video Solution

39. Evaluate the integral

$$\int_0^{\pi} x \sin^3 x dx$$



Watch Video Solution

40. Evaluate $\int_0^{\pi} \sin^3 \theta (1 + 2\cos \theta)(1 + \cos \theta)^2 d\theta$



Watch Video Solution

Exercise - 2.4 (Level-1)

1. Find the values of the following integrals

$$\int_0^{\frac{\pi}{2}} \sin^8 x dx$$



Watch Video Solution

2. Find the value of the following integral

$$\int_0^{\frac{\pi}{2}} \sin^9 x dx$$



Watch Video Solution

3. Find the value of the following integral

$$\int_0^{\frac{\pi}{2}} \cos^6 x dx$$



Watch Video Solution

4. Find the value of the following integral

$$\int_0^{\frac{\pi}{2}} \cos^7 x dx$$



Watch Video Solution

5. Find the values of the following integrals

(ii) $\int_0^{\frac{\pi}{2}} \sin^{10} x dx$



Watch Video Solution

6. Find the values of the following integrals

(iii) $\int_0^{\frac{\pi}{2}} \cos^{11} x dx$

[Watch Video Solution](#)

7. Find the values of the following integrals

(iv) $\int_0^{\frac{\pi}{4}} \sec^3 x dx$

[Watch Video Solution](#)

8. Find the values of the following integrals

(v) $\int_0^{\frac{\pi}{4}} \sec^6 x dx$

[Watch Video Solution](#)

9. Find the values of the following integrals

(i) $\int_0^{\frac{\pi}{2}} \sin^4 x \cos^4 x dx$

[Watch Video Solution](#)

10. Find the values of the following integrals

(ii) $\int_0^{\frac{\pi}{2}} \sin^4 x \cos^6 x dx$



Watch Video Solution

11. $\int_0^{\frac{\pi}{2}} \sin^6 x \cos^6 x dx$



Watch Video Solution

12. Find the values of the following integrals

(iii) $\int_0^{\frac{\pi}{2}} \sin^2 x \cos^7 x dx$



Watch Video Solution

13. Evaluate $\int_0^{\pi/2} \sin^5 x \cos^4 x dx$



Watch Video Solution

14. Find the values of the following integrals

(i) $\int_0^{\pi} \sin^3 x \cos^3 x dx$



Watch Video Solution

15. Find the values of the following integrals

(ii) $\int_0^{\pi} \cos^3 x \sin^4 x dx$



Watch Video Solution

16. Find the value of the integral

$\int_0^{\pi} \sin^3 x \cos^6 x dx$



Watch Video Solution

17. $\int_0^{\pi} \sin^7 x \cos^7 x dx$



Watch Video Solution

[Watch Video Solution](#)

18. $\int_0^{\pi} \sin^4 x \cos^5 x dx$

[Watch Video Solution](#)

19. Find the value of the integral

$$\int_0^{2\pi} \sin^2 x \cos^4 x dx$$

[Watch Video Solution](#)

20. Find $\int_0^{2\pi} \sin^4 x \cos^6 x dx$

[Watch Video Solution](#)

21. $\int_0^{2\pi} \sin^7 x \cos^5 x dx$

[Watch Video Solution](#)

22. $\int_0^{2\pi} \sin^{11} x \cos^{10} x dx$



Watch Video Solution

23. Find the values of the following integrals

(i) $\int_{-2\pi}^{2\pi} \cos^6 x dx$



Watch Video Solution

24. Find $\int_{-\pi/2}^{\pi/2} \sin^2 x \cos^4 x dx$



Watch Video Solution

25. Find the value of the integral

$\int_{-\pi/2}^{\pi/2} \sin^2 \theta \cdot \cos^7 \theta d\theta$



Watch Video Solution

26. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^3 \theta \cos^3 \theta d\theta$



Watch Video Solution

27. $\int_{-\pi/2}^{\pi/2} \sin^2 x \cos^2 x (\sin x + \cos x) dx =$



Watch Video Solution

28. $\int_0^{2\pi} x \sin^6 x \cos^5 x dx =$



Watch Video Solution

29. Evaluate the following integrals

(ii) $\int_0^{\pi} x \sin^5 x \cos^6 x dx$



Watch Video Solution

30. Find $\int_0^{\pi} x \sin^7 x \cos^6 x dx$



Watch Video Solution

31. Evaluate

$$\int_0^{\frac{1}{\sqrt{2}}} \frac{x^3}{\sqrt{1-x^2}} dx$$



Watch Video Solution

32. Evaluate

$$\int_0^{\frac{1}{2}} \frac{x^7}{\sqrt{1-x^4}} dx$$



Watch Video Solution

33. Find $\int_{-a}^a x^2 (a^2 - x^2)^{3/2} dx$



Watch Video Solution

34. Evaluate the integral

$$\int_0^4 (16 - x^2)^{5/2} dx$$



Watch Video Solution

35. Evaluate the integral

$$\int_0^1 x^5 (1 - x)^{5/2} dx$$



Watch Video Solution

36. Find the value of the integral

$$\int_0^a x (a^2 - x^2)^{7/2} dx$$



Watch Video Solution

37. Find the value of the integral

$$\int_0^2 x^{3/2} \sqrt{2-x} dx$$



Watch Video Solution

38. Evaluate

$$\int_0^1 x^6 \sin^{-1} x dx$$



Watch Video Solution

39. If $I_n = \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \cot^n x dx$, prove that $I_n + I_{n-2} = \frac{1}{n-1}$



Watch Video Solution

40. If $I_n = \int_{\frac{\pi}{6}}^{\pi} \operatorname{cosec}^n x dx$, show that $(n-1)I_n = 2^{n-2} \sqrt{3} + (n-2)I_{n-2}$



Watch Video Solution

Exercise -2.5 (Level-1)

1. Evaluate the following integrals

$$\int_0^{50} e^{\{x\}} dx \text{ where } \{x\} \text{ denotes the fractional part of } x$$



Watch Video Solution

2. Evaluate the following integrals

$$\int_0^{\frac{41}{2}} e^{2x - \{2x\}} dx \text{ where } [\] \text{ denotes the GIF}$$



Watch Video Solution

3. Evaluate the following integrals

$$\int_0^{100\pi} \sqrt{\frac{1 - \cos 2x}{2}} dx$$



Watch Video Solution

4. Evaluate the following integrals

$$\int_0^{\frac{16\pi}{3}} |\sin x| dx$$



Watch Video Solution

5. Suppose that $f: \mathbb{R} \rightarrow \mathbb{R}$ is a continuous periodic function and T is the period of it. Let $a \in \mathbb{R}$. Then prove that for any positive integer n

$$\int_a^{a+nT} f(x) dx = n \int_a^{a+T} f(x) dx$$



Watch Video Solution

6. Let $f(x)$ be a periodic function with period 1 and integrable over any finite interval. Also for two real numbers a and b and for any two positive integers m and n ($m \neq n$), $\int_a^{a+m} f(x) dx = \int_b^{b+n} f(x) dx$. Then calculate the value of $\int_m^n f(x) dx$



Watch Video Solution

Exercise-2.6 (Level-1)

1. Find the values of the following integrals (where $[.]$ is gif and $\{.\}$ is fractional part)

Evaluate the following

$$\int_0^{30} [x] dx$$



Watch Video Solution

2. Evaluate the following

$$(ii) \int_{-2}^2 [x] dx$$



Watch Video Solution

3. Evaluate the following

$$(iii) \int_0^5 x[x] dx$$



Watch Video Solution

4. Find the values of the following integrals (where $[.]$ is gif and $\{.\}$ is fractional part)

Evaluate the following

$$\int_0^{1.5} [x^2] dx$$



Watch Video Solution

5. Evaluate the following

$$(v) \int_0^5 [\sqrt{x}] dx$$



Watch Video Solution

6. Evaluate the following

$$(vi) \int_0^{25} [\sqrt{x}] dx$$



Watch Video Solution

7. Find the values of the following integrals (where $[.]$ is gif and $\{.\}$ is fractional part)

Evaluate the following

$$\int_0^{50} (x - [x])dx$$



Watch Video Solution

8. Prove that $\int_0^x [t]dt = \frac{[x]([x] - 1)}{2} + [x](x - [x])$



Watch Video Solution

9. Evaluate $\int_0^\pi [2\sin x]dx$



Watch Video Solution

10. Evaluate $\int_0^\infty [2e^{-x}]dx$



Watch Video Solution

11. Evaluate $\int_{-1}^{15} \operatorname{sgn}(x - [x]) dx$



Watch Video Solution

12. Evaluate $\int_0^{\frac{\pi}{4}} [\sin x + [\cos x + [\tan x + [\sec x]]]] dx$



Watch Video Solution

13. Evaluate $\int_{-n}^n (-1)^{[x]} dx, n \in \mathbb{N}$ (Hint : Integrand is odd)



Watch Video Solution

14. Evaluate $\int_0^{\frac{5\pi}{12}} [\tan x] dx$



Watch Video Solution

Exercise - 2.7 (Level-2)

1. $\lim_{n \rightarrow \infty} \left[\frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{2n} \right]$



Watch Video Solution

2. Evaluate the limit .

$$\lim_{n \rightarrow \infty} \left[\frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{6n} \right]$$



Watch Video Solution

3. $\lim_{n \rightarrow \infty} \left\{ \frac{1}{2n+1} + \frac{1}{2n+2} + \dots + \frac{1}{3n} \right\} =$



Watch Video Solution

4. $\lim_{n \rightarrow \infty} \left[\frac{1}{3n+1} + \frac{1}{3n+2} + \dots + \frac{1}{4n} \right]$

[Watch Video Solution](#)

$$5. \lim_{n \rightarrow \infty} \sum_{r=0}^{n-1} \left(\frac{r}{n^2 + r^2} \right)$$

[Watch Video Solution](#)

$$6. \lim_{n \rightarrow \infty} \sum_{r=1}^n \frac{1}{n} \left[\sqrt{\frac{n+r}{n-r}} \right]$$

[Watch Video Solution](#)

$$7. \lim_{n \rightarrow \infty} \sum_{r=1}^n \left[\frac{1}{\sqrt{4n^2 - r^2}} \right]$$

[Watch Video Solution](#)

8. Evaluate the limit.

$$\lim_{n \rightarrow \infty} \frac{\sqrt{n+1} + \sqrt{n+2} + \dots + \sqrt{n+n}}{n\sqrt{n}}$$



Watch Video Solution

$$9. \lim_{n \rightarrow \infty} \left\{ \frac{1}{\sqrt{n^2+1}} + \frac{1}{\sqrt{n^2+2^2}} + \dots + \frac{1}{\sqrt{n^2+n^2}} \right\} =$$



Watch Video Solution

$$10. \lim_{n \rightarrow \infty} \left[\frac{1}{n} + \frac{1}{\sqrt{n^2-1^2}} + \frac{1}{\sqrt{n^2-2^2}} + \dots \text{to } n \text{ terms} \right]$$



Watch Video Solution

$$11. \lim_{n \rightarrow \infty} \left[\frac{1n^2}{(n+1)^3} + \frac{n^2}{(n+2)^3} + \frac{n^2}{(n+3)} + \dots \text{to } n \text{ terms} \right]$$

[Watch Video Solution](#)

$$12. \lim_{n \rightarrow \infty} \left[\frac{\sqrt{n^2 - 1^2}}{n^2} + \frac{\sqrt{n^2 - 2^2}}{n^2} + \frac{\sqrt{n^2 - 3^2}}{n^2} + \dots + n \text{ terms} \right] =$$

[Watch Video Solution](#)

$$13. \lim_{n \rightarrow \infty} \frac{1}{n} \left[\sec^2 \frac{\pi}{4n} + \sec^2 \frac{2\pi}{4n} + \dots + \sec^2 \frac{n\pi}{4n} \right] =$$

[Watch Video Solution](#)

$$14. \lim_{n \rightarrow \infty} \left[\frac{n^2}{(n^2 + 1)^{3/2}} + \frac{n^2}{(n^2 + 2)^{3/2}} + \dots + \frac{n^2}{[n^2 + (n - 1)^2]^{3/2}} \right]$$

[View Text Solution](#)

$$15. \lim_{n \rightarrow \infty} \left[\frac{\sqrt{n}}{\sqrt{n^3}} + \frac{\sqrt{n}}{\sqrt{(n+4)^3}} + \dots + \frac{\sqrt{n}}{\sqrt{[n+4(n-1)]^3}} \right]$$



Watch Video Solution

$$16. \lim_{n \rightarrow \infty} \left[\frac{1}{n^2} \sec^2 \cdot \frac{1}{n^2} + \frac{2}{n^2} \sec^2 \cdot \frac{4}{n^2} + \dots + \frac{1}{n} \sec^2 1 \right] =$$



Watch Video Solution

$$17. \lim_{n \rightarrow \infty} \left[\frac{1^3}{n^4 + 1^4} + \frac{2^3}{n^4 + 2^4} + \dots + \frac{n^3}{n^4 + n^4} \right]$$



Watch Video Solution

$$18. \lim_{n \rightarrow \infty} \frac{1}{n} \left[e^{\frac{1}{n}} + e^{\frac{2}{n}} + \dots + e^{\frac{n}{n}} \right]$$



Watch Video Solution

19. $\lim_{n \rightarrow \infty} \left[\frac{1^{99} + 2^{99} + 3^{99} + \dots + n^{99}}{n^{100}} \right]$



Watch Video Solution

20. Evaluate $\lim_{n \rightarrow \infty} \left[\left(1 + \frac{1}{n}\right) \left(1 + \frac{2}{n}\right) \cdot \cdot \cdot \left(1 + \frac{n}{n}\right) \right]^{\frac{1}{n}}$



Watch Video Solution

21. $\lim_{n \rightarrow \infty} \left[\left(1 + \frac{1}{n^2}\right)^{\frac{2}{n^2}} \left(1 + \frac{2^2}{n^2}\right)^{\frac{4}{n^2}} \left(1 + \frac{3^2}{n^2}\right)^{\frac{6}{n^2}} \dots \left(1 + \frac{n^2}{n^2}\right)^{\frac{2n}{n^2}} \right]$



Watch Video Solution

Exercise (Level-2)

1. Evaluate $\int_2^3 \frac{2x^5 + x^4 - 2x^3 + 2x^2 + 1}{(x^2 + 1)(x^4 - 1)} dx$



Watch Video Solution

2. Show that $\int_0^{\pi/4} \frac{x^2}{(x \sin x + \cos x)^2} dx = \frac{4 - \pi}{4 + \pi}$



Watch Video Solution

3. Show that $\int_1^2 \left(x + \frac{1}{x}\right)^{3/2} \left(\frac{x^2 - 1}{x^2}\right) dx = \left(\frac{5}{2}\right)^{3/2} - \frac{8\sqrt{2}}{5}$



Watch Video Solution

4. Show that $\int_2^{2\sqrt{3}} x^3 (x^2 - 3)^{3/2} dx = \frac{16012}{35}$



Watch Video Solution

5. Prove that $\int_0^{\infty} \frac{dx}{(x^2 + a^2)(x^2 + b^2)} = \frac{\pi}{2ab(a + b)}$

 **Watch Video Solution**

6. Prove that $\int_a^{\infty} \frac{dx}{x^4 \sqrt{a^2 + x^2}} = \frac{2 - \sqrt{2}}{3a^4}$

 **Watch Video Solution**

7. Prove that $\int_0^{\pi/2} \operatorname{cosec}\left(x - \frac{\pi}{3}\right) \operatorname{cosec}\left(x - \frac{\pi}{6}\right) dx = -2\log 3$

 **Watch Video Solution**

8. Show that $\int_0^{\infty} \frac{dx}{\left[x + \sqrt{x^2 + 1}\right]^3} = \frac{3}{8}$

 **Watch Video Solution**

9. Show that $\int_0^{\pi} \cos \left(2 \cot^{-1} \left(\sqrt{\frac{1-x}{1+x}} \right) \right) dx = -\frac{1}{2}$



Watch Video Solution

10. Show that $\int_0^{\pi/2} \frac{dx}{3+4\sin x} = \frac{1}{\sqrt{7}} \log \left(\frac{4+\sqrt{7}}{3} \right)$



Watch Video Solution

11. If $\int (\log 2)^x \frac{dy}{\sqrt{e^y - 1}} = \frac{\pi}{6}$, prove that $x = \log 4$



Watch Video Solution

12. If $\int_{\log 2}^x \frac{1}{e^x - 1} dx = \log \frac{3}{2}$, show that $x = \log 4$



Watch Video Solution

13. Show that $\int_0^{1/2} \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx = \frac{1}{2} - \frac{\sqrt{3}}{12} \pi$



Watch Video Solution

14. Prove that $\int_0^{\pi/2} \tan^{-1}(\sin x) \cdot \sin 2x = \frac{\pi}{2} - 1$



Watch Video Solution

15. Show that (a) $\int_e^{e^2} \frac{1}{\log x} dx = \int_1^2 \frac{e^x}{x} dx$

(b) $\int_t^1 \frac{dx}{1+x^2} = \int_1^{1/t} \frac{dx}{1+x^2}$



Watch Video Solution

16. Prove that $\int_0^1 \log(\sqrt{1-x} + \sqrt{1+x}) dx = \frac{1}{2} \log 2 + \frac{\pi}{4} - \frac{1}{2}$



Watch Video Solution

17. Show that $\int_0^{\pi/4} x \cos x \cos 3x dx = \frac{\pi - 3}{16}$



Watch Video Solution

18. Prove that $\int_0^{\infty} e^{-2x} (\sin 2x + \cos 2x) dx = \frac{1}{2}$



Watch Video Solution

19. Show that $\int_0^{\pi/2} \frac{\cos x}{(1 + \sin x)(2 + \sin x)} dx = \log\left(\frac{4}{3}\right)$



Watch Video Solution

20. Show that $\int_1^{7\sqrt{2}} \frac{1}{x(2x^7 + 1)} dx = \frac{1}{7} \log\left(\frac{6}{5}\right)$



Watch Video Solution

21. Show that $\int_0^{\pi/2} \frac{\sin x \cos x}{\cos^2 x + 3 \cos x + 2} dx = \log\left(\frac{9}{8}\right)$



Watch Video Solution

22. Show that $\int_0^{1/3} \frac{dx}{(1+x^2)\sqrt{1-x^2}} = \frac{\pi}{4\sqrt{2}}$



Watch Video Solution

23. Show that $\int_0^1 \frac{dx}{(1+x^2)\sqrt{2+x^2}} = \frac{\pi}{6}$



Watch Video Solution

24. Show that $\int_0^{1/2} \frac{dx}{(1-2x^2)\sqrt{1-x^2}} = \frac{1}{2} \log(2 + \sqrt{3})$



Watch Video Solution

25. $\int_0^{\log 5} \frac{e^x \sqrt{e^x - 1}}{e^x + 3} dx =$



Watch Video Solution

26. Show that

$$\int_0^{\pi/2} \frac{\cos^2 \theta}{\cos^2 \theta + 4 \sin^2 \theta} d\theta = \frac{\pi}{6}$$



Watch Video Solution

27. Show that $\int_0^{\pi/4} \sqrt{\tan \theta} d\theta = \frac{1}{\sqrt{2}} \log(\sqrt{2} - 1) + \frac{\pi}{2\sqrt{2}}$



Watch Video Solution

28. Show that $\int_0^{\pi/4} \frac{dx}{\cos^4 x - \cos^2 x \sin^2 x + \sin^4 x} = \frac{\pi}{2}$



Watch Video Solution

29. Show that $\int_0^{\pi/2} \frac{\sin x \cos x}{1 + \sin^4 x} dx = \frac{\pi}{8}$



Watch Video Solution

30. Prove that $\int_0^{\pi/2} \frac{\cos^2 x \sin x}{\sqrt{1 + \cos^2 x}} dx = \frac{\sqrt{2} - \log(\sqrt{2} + 1)}{2}$



Watch Video Solution

31. Show that $\int_0^{\infty} \frac{dx}{\left(x + \sqrt{1 + x^2}\right)^n} = \frac{n}{n^2 - 1}, (n \in N, n > 1)$



Watch Video Solution

32. $\int_0^{\pi/4} [\sqrt{\tan x} + \sqrt{\cot x}] = dx$



Watch Video Solution

33. Show that $\int_0^{\pi/2} (\sqrt{\tan x} + \sqrt{\cot x}) dx = \pi\sqrt{2}$



Watch Video Solution

34. Find the value of $\lim_{x \rightarrow 0} \frac{1}{x^3} \int_0^x \frac{t(\ln(1+t))}{t^4 + 4} dt$



Watch Video Solution

35. Find the value of $\int_0^1 \frac{x^4(1-x)^4}{1+x^2} dx$



Watch Video Solution

36. For any real number x , let $[x]$ denote the largest less than or equal to x . Let f be a real valued function defined on the interval $[-10, 10]$ by

$$f(x) = \begin{cases} x - [x], & \text{if } [x] \text{ is odd} \\ 1 + [x] - x, & \text{if } [x] \text{ is even} \end{cases}$$

Show that $\int_{-10}^{10} f(x) \cos \pi x dx = 4$



Watch Video Solution

37. Let f be a real-valued function defined on the interval $(-1, 1)$ such that $e^{-x}f(x) = 2 + \int_0^x \sqrt{t^4 + 1} dt$ for all $x \in (-1, 1)$ and let f^{-1} be the inverse function of f . then show that $\left(f^{-1}(2)\right)^1 = \frac{1}{3}$



Watch Video Solution

38. Let $p(x)$ be a function defined on $\mathbb{R}$ such that $p'(x) = p'(1-x)$, for all $x \in [0, 1]$, $p(0) = 1$ and $p(1) = 41$. Then show that $\int_0^1 p(x) dx = 21$



Watch Video Solution