



MATHS

BOOKS - NDA PREVIOUS YEARS

DEFINITE INTEGRATION & ITS APPLICATION

Mcqs

1. If $f(x) = A \sin\left(\frac{\pi x}{2}\right) + B$ and $f'\left(\frac{1}{2}\right) = \sqrt{2}$

and $\int_0^1 f(x) = \frac{2A}{\pi}$, then what is the value of B ?

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

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

C. 0

D. 1

Answer: C



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2. If m and n are integers, then what is the value

of $\int_0^{\pi} \sin mx \sin nx \, dx$, if $m \neq n$?

A. 0

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

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

D. mn

Answer: A



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3. What is the area under the curve

$y = |x| + |x - 1|$ between $x = 0$ and $x = 1$?

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

B. 1

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

D. 2

Answer: B



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4. The following question consist of two statement, one labelled as the 'Assertion (A)' and the other as 'Reason (R)'. You are are to examine these two statement carefully and select the answer.

Assertion (A) : $\int_1^e \ln^2 x dx = e - 2$

Reason (R) : $I_n = \int_1^e \ln^n x dx = e - nI_{n-1}$

- A. Both A and R are individually true and R is the correct explanation of A
- B. Both A and R are individually true and R is not the correct explanation of A
- C. A is true but R is false
- D. A is false but R is true.

Answer: A



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5. What is the value of $\int_0^1 (x - 1)e^{-x} dx$?

A. 0

B. e

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

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

Answer: D



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6. If $\int_{\ln 2}^x (e^x - 1)^{-1} dx = \ln' \frac{3}{2}$ then what is the value of x ?

A. e^2

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

C. $\ln 4$

D. 1

Answer: C



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7. If $\int_{-3}^2 f(x) dx = \frac{7}{3}$ and $\int_{-3}^9 f(x) dx = -\frac{5}{6}$,
then what is the value of $\int_2^9 f(x) dx$?

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

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

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

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

Answer: A



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8. The following question consist of two statements, one labelled as the 'Assertion (A)' and the other as 'Reason (R)'. You are to examine these two statement carefully and select the answer.

$$\text{Assertion (A) : } \int_0^{\pi} \sin^7 x dx = 2 \int_0^{\pi/2} \sin^7 x dx$$

Reason : $\sin^7 x$ is an odd function.

- A. Both A and R are individually true and R is the correct explanation of A
- B. Both A and R are individually true and R is not the correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: B



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9. What is the area enclosed by the curve

$$2x^2 + y^2 = 1?$$

A. 2π

B. π

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

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

Answer: D



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10. What is $\int_0^1 x(1-x)^9 dx$ equal to ?

A. $\frac{1}{110}$

B. $\frac{1}{111}$

C. $\frac{1}{112}$

D. $\frac{1}{119}$

Answer: A



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11. $\int_{-1}^1 x|x|dx$ is equal to

A. 2

B. 1

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

D. 0

Answer: D



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12. What is the value of $\int_0^{\pi/2} \cos^8 dx$?

A. $\frac{35\pi}{256}$

B. $\frac{70}{256}$

C. $\frac{16}{35}$

D. $\frac{8\pi}{35}$

Answer: A



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13. What is $\int_a^b \frac{\log x}{x} dx$ equal to ?

A. $(1/2)\log(ab) \cdot \log\left(\frac{b}{a}\right)$

B. $\log b / \log a$

C. $\log(b/a)$

D. $(1/2)\log[(a + b) / b]$

Answer: A



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14. What is the area of the region bounded by the line $3x - 5y = 15$, $x = 1$, $x = 3$ and x-axis in sq

units ?

A. $\frac{36}{5}$

B. $\frac{18}{5}$

C. $\frac{9}{5}$

D. $\frac{3}{5}$

Answer: B



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15. What is the value of $\int_0^1 x e^{x^2} dx$?

A. $\frac{(e - 1)}{2}$

B. $e^2 - 1$

C. $2(e - 1)$

D. $e - 1$

Answer: A



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16. What is the area of the ellipse $4x^2 + 9y^2 = 1$.

A. 6π

B. $\frac{\pi}{36}$

C. $2(e - 1)$

D. $e - 1$

Answer: C



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17. The value of $\int_{-2}^2 (ax^3 + bx + c) dx$ depends on which following ?

A. Values of x only

B. Values of each of a,b and c

C. Value of c only

D. Value of b only

Answer: C



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18. What are the value of p which satisfy the

equations $\int_0^P (3x^2 + 4x - 5) dx = p^3 - 2$?

A. $1/2$ and 2

B. $-1/2$ and 2

C. $1/2$ and -2

D. $-1/2$ and -2

Answer: A



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19. What is the value of $\int_0^{\frac{\pi}{2}} \log(\tan x) dx$?

A. 0

B. 1

C. -1

D. $\pi/4$

Answer: A



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20. What is $\int_0^1 x(1-x)^n dx$ equal to ?

A. $\frac{1}{n(n+1)}$

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

C. 1

D. 0

Answer: B



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21. What is the value of k if the area bounded by the _____ curve $y = \sin kx$, $y = 0$, $x = \pi/k$, $x = \pi/(3k)$ is 3 sq units ?

A. $1/2$

B. 1

C. $3/2$

D. 2

Answer: A



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22. if $f(x) = a + bx + cx^2$, then what is

$$\int_0^1 f(x) dx \text{ equal to ?}$$

A. $[f(0) + 4f(1/2) + f(1)] / 6$

B. $[f(0) + 4f(1/2) + f(1)] / 3$

C. $[f(0) + 4f(1/2) + f(1)]$

D. $[f(0) + 2f(1/2) + f(1)] / 6$

Answer: A



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23. What is the area bounded by the curve $y = 4x - x^2 - 3$ and the x-axis ?

A. $2/3$ sq units.

B. $4/3$ sq unit

C. $5/3$ sq unit

D. $4/5$ sq unit

Answer: B



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24. What is $\int_0^{\pi/2} \frac{\sin^3 x}{\sin^3 x + \cos^3 x} dx$?

A. π

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

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

D. 0

Answer: C



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25. What is the area enclosed between the curves

$y^2 = 12x$ and the lines $x = 0$ and $y = 6$?

A. 2 sq. unit

B. 4 sq. unit

C. 6 sq. unit

D. 8 sq. unit

Answer: C



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26. What is $\int_{-\pi/4}^{\pi/4} \tan^3 x dx$ equal to ?

A. $\sqrt{3}$

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

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

D. 0

Answer: D



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27. What is the value of $\int_{\pi/6}^{\pi/4} \frac{dx}{\sin x \cos x}$?

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

B. $\ln \sqrt{3}$

C. $2 \ln 3$

D. $4 \ln 3$

Answer: B



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28. What is the $\int_1^2 \left(\frac{1}{x} - \frac{1}{x^2} \right) dx$?

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

B. $e(e - 1)$

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

D. 0

Answer: A



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29. What is the area under the curve $f(x) = xe^x$ above the x -axis and between the lines $x = 0$ and $x = 1$?

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

B. 1 sq unit

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

D. 2 sq unit

Answer: B



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30. What is the area bounded by the curve $y = x^2$ and the line $y = 16$?

A. $32/3$

B. $64/3$

C. $256/3$

D. $128/3$

Answer: C



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31. What is the area of the region bounded by the curve $f(x) = 1 - \frac{x^2}{4}$, $x \in [-2, 2]$, and the x-axis ?

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

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

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

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

Answer: A



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32. What is the value the integral $\int_{-1}^1 |x| dx$?

A. 1

B. 0

C. 2

D. -1

Answer: A



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33. What is the area bounded by the curves $y = e^x$, $y = e^{-x}$ and the straight line $x = 1$?

- A. $\left(e + \frac{1}{e}\right)$ sq unit
- B. $\left(-\frac{1}{e}\right)$ sq unit
- C. $\left(e + \frac{1}{e} - 2\right)$ sq unit
- D. $\left(e - \frac{1}{e} - 2\right)$ sq unit

Answer: C



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34. If $I_n = \int_0^4 x dx$ then what is $I_n + I_{n-2}$ equal to ?

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

B. $\frac{1}{(n-1)}$

C. $\frac{n}{(n-1)}$

D. $\frac{1}{(n-2)}$

Answer: B



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35. What is $\int_0^{\pi} \frac{dx}{1 + 2\sin^2 x}$ equal to ?

A. π

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

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

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

Answer: C



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36. If $f(x)$ is an even function, then what is

$$\int_0^{\pi} f(\cos x) dx \text{ equal to ?}$$

A. 0

B. $\int_0^{\pi/2} f(\cos x) dx$

C. $2 \int_0^{\pi/2} f(\cos x) dx$

D. 1

Answer: C



37. What is the area between the curve

$y = \cos 3x$, $0 \leq x \leq \frac{\pi}{6}$ and the co-ordinate axes

?

- A. 1 square unit
- B. $\frac{1}{2}$ square unit
- C. $\frac{1}{3}$ square unit
- D. $\frac{1}{4}$ square unit

Answer: C



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38. what is the area enclosed by the equation

$$x^2 + y^2 = 2$$

- A. 4π square units
- B. 2π square units
- C. $4\pi^2$ square units
- D. 4 square units

Answer: B



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39. If $\int_1^2 \{K^2 + (4 - 4K)x + 4x^3\} dx \leq 12$,

then which one of the following is correct ?

A. $K = 3$

B. $0 \leq K \leq 3$

C. $K \leq 4$

D. $K = 0$

Answer: A



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40. Find area bounded by the curve

$$\sqrt{x} + \sqrt{y} = \sqrt{a} \text{ \& coordinate axes.}$$

A. $\frac{5a^2}{6}$

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

C. $\frac{a^2}{2}$

D. $\frac{a^2}{6}$

Answer: D



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41. What is $\int_{-\pi/2}^{\pi/2} |\sin x| dx$ equal to ?

A. 2

B. 1

C. π

D. 0

Answer: A



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42. The area bounded by the curve $x = f(y)$, the y-axis and the two lines $y = a$ and $y = b$ is equal to :

A. $\int_a^b y dx$

B. $\int_a^b y^2 dx$

C. $\int_a^b x dy$

D. None of the above

Answer: C



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43. What is $\int_0^1 \frac{\tan^{-1}}{1+x^2}$ equal to ?

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

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

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

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

Answer: D



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44. What is $\int_{-1}^1 x|x|dx$ equal to ?

A. 2

B. 1

C. 0

D. -1

Answer: C



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45. What is $\int_0^1 \frac{\tan^{-1} x}{1+x^2} dx$ equal to ?

A. $\frac{\pi^2}{8}$

B. $\frac{\pi^2}{32}$

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

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

Answer: B



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46. What is $\int_0^{\pi/2} \sin 2x \ln(\cot x) dx$ equal to ?

A. 0

B. $\pi \ln 2$

C. $-\pi \ln 2$

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

Answer: A



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47. Find the area between the x-axis and the curve

$y = \sin x$ from $x = 0$ to $x = 2\pi$

A. 4 square units

B. 2 square units

C. 4 square units

D. 8 square units

Answer: B



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48. What is the area of the region bounded by the lines $y = x$, $y = 0$ and $x = 4$?

- A. 4 square units
- B. 8 square units
- C. 12 square units
- D. 16 square units

Answer: B



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49. What $\int_0^2 \frac{dx}{x^2 + 4}$ equal to ?

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

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

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

D. None of the above

Answer: C



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50. What is $\int_{-a}^a (x^3 + \sin x) dx$ equal to

A. a

B. $2a$

C. 0

D. 1

Answer: C



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51. What is $\int_0^1 x e^x dx$ equal to

A. 1

B. -1

C. 0

D. e

Answer: A



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52. What is $\int_{-\frac{\pi}{6}}^{\frac{\pi}{6}} \frac{\sin^5 x \cos^3 x}{x^4} dx$ equal to ?

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

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

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

D. 0

Answer: D



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53. What is the area of the region enclosed by

$y = 2|x|$ and $y = 4$?

A. 2 square unit

B. 4 square unit

C. 8 square unit

D. 16 square unit

Answer: C



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54. What is the area of the parabola $y^2 = x$ bounded by its latus rectum ?

A. $\frac{1}{12}$ square unit

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

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

D. None of the above

Answer: B



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55. What is $\int_1^2 \ln x dx$ equal to ?

A. $\ln 2$

B. 1

C. $\ln\left(\frac{4}{e}\right)$

D. $\ln\left(\frac{e}{4}\right)$

Answer: C



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56. What is the area bounded by the lines $x = 0$, $y = 0$ and $x + y + 2 = 0$?

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

B. 1 square unit

C. 2 square units

D. 4 square units

Answer: C



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57. What is the area of the parabola $x^2 = y$ bounded by the lines $y = 1$?

- A. $\frac{1}{3}$ square unit
- B. $\frac{2}{3}$ square unit
- C. $\frac{4}{3}$ square units
- D. 2 square units

Answer: C



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58. What is the area bounded by

$$y = \tan x, y = 0 \text{ and } x = \frac{\pi}{4} ?$$

A. $\ln 2$ square units

B. $\frac{\ln 2}{2}$ square units

C. $2(\ln)2$ square units

D. None of these

Answer: B



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59. What is $\int_0^2 e^{\ln x} dx$ equal to ?

A. 1

B. 2

C. 4

D. None of the above

Answer: B



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60. What is the derivative of $\sqrt{\frac{1 + \cos x}{1 - \cos x}}$?

A. $\frac{1}{2} \sec^2, \frac{x}{2}$

B. $-\frac{1}{2} \cos ec^2 \frac{x}{2}$

C. $-\cos ec^2, \frac{x}{2}$

D. None of these

Answer: B



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61. What is $\int_0^1 \frac{e^{\tan^{-1} x} dx}{1 + x^2}$ equal to

A. $e^{\frac{\pi}{4}} - 1$

B. $e^{\frac{\pi}{4}} + 1$

C. $e - 1$

D. e

Answer: A



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Directions

1.
$$I_1 = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1 + \sqrt{\tan x}}$$

and

$$I_2 = \frac{\int \sqrt{\sin x} dx}{\sqrt{\sin x} + \sqrt{\cos x}}$$

What is $I_1 - I_2$ equal to ?

A. 0

B. $2I_1$

C. π

D. None of the above

Answer: A



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2.
$$I_1 = \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1 + \sqrt{\tan x}}$$

and

$$I_2 = \frac{\int \sqrt{\sin x} dx}{\sqrt{\sin x} + \sqrt{\cos x}}$$

What is I_1 equal to ?

A. $\pi / 24$

B. $\pi / 18$

C. $\pi / 12$

D. $\pi / 6$

Answer: C



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3. What is $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} x \sin x dx$ equal to ?

A. 0

B. 2

C. -2

D. π

Answer: B



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4. What is $\int_0^{\frac{\pi}{2}} \ln(\tan x) dx$ equal to ?

A. $\ln 2$

B. $-\ln 2$

C. 0

D. None of these

Answer: C



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5. Find the area of the parabola $y^2 = 4ax$ bounded by its latus rectum.

A. $2b^3 / 3$ square units

B. $4b^2 / 3$ square unit

C. b^2 square unit

D. $8b^2 / 3$ square unit

Answer: D



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6. Consider $I = \int_0^{\pi} \frac{x dx}{1 + \sin x}$

What is I equal to ?

A. π

B. 0

C. π

D. 2π

Answer: C



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7. Consider $I = \int_0^{\pi} \frac{x dx}{1 + \sin x}$

What is $\int_0^{\pi} \frac{(\pi - x) dx}{1 + \sin x}$ equal to ?

A. π

B. $\pi / 2$

C. 0

D. 2π

Answer: A



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8. Consider $I = \int_0^{\pi} \frac{x dx}{1 + \sin x}$

What is $\int_0^{\pi} \frac{dx}{1 + \sin x}$ equal to ?

A. 1

B. 2

C. 4

D. -2

Answer: B



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9. Consider is $\int_0^{\pi/2} \ln(\sin x) dx$ equal to ?

What is $\int_0^{\pi/2} \ln(\sin x) dx$ equal to ?

A. $4I$

B. $2I$

C. I

D. $I/2$

Answer: D



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10. Consider is $\int_0^{\pi/2} \ln(\sin x) dx$ equal to ?

What is $\int_0^{\pi/2} \ln(\cos x) dx$ equal to ?

A. $I/2$

B. I

C. $2I$

D. $4I$

Answer: A



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11. What is $\int_0^{\pi/2} \frac{dx}{a^2 \cos^2 x + b^2 \sin^2 x}$ equal to ?

A. $2ab$

B. $2\pi ab$

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

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

Answer: C





12. The area of a triangle, whose vertices are $(3, 4)$, $(5, 2)$ and the point of the intersection of the lines $x = a$ and $y = 5$, is 3 square units.

What is the value of a ?

A. 2

B. 3

C. 4

D. 5

Answer: D



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13. प्रथम चतुर्थांश में वृत्त $x^2 + y^2 = 4$, रेखा $x = \sqrt{3}y$

एवं x-अक्ष द्वारा घिरे क्षेत्र का क्षेत्रफल ज्ञात कीजिए।

A. $\frac{\pi}{3} - \frac{\sqrt{3}}{2}$

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

C. $\frac{\pi}{3} - \frac{1}{2}$

D. None of these

Answer: A



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14. Find the area of the region in the first quadrant enclosed by $x = a \xi s$, the line $x = \sqrt{3} y$ and the circle $x^2 + y^2 = 4$.

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

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

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

D. None of these

Answer: A



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15. Consider the curves $y = \sin x$ and $y = \cos x$.

What is the area of the region bounded by the

above two curves and the lines

$$x = 0 \text{ and } x = \frac{\pi}{4}.$$

A. $\sqrt{2} - 1$

B. $\sqrt{2} + 1$

C. $\sqrt{2}$

D. 2

Answer: A



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16. Consider the curves $y = \sin x$ and $y = \cos x$.

What is the area of the region bounded by the above two curves and the lines $x = \frac{\pi}{4}$ and $x = \frac{\pi}{2}$?

A. $\sqrt{2} - 1$

B. $\sqrt{2} + 1$

C. $2\sqrt{2}$

D. 2

Answer: C



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17. Consider the integral $I_m = \int_0^\pi \frac{\sin 2mx}{\sin x} dx$,

where m is a positive integer.

What is I_1 equal to ?

A. 0

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

C. 1

D. 2

Answer: A



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18. Consider the integral $I_m = \int_0^\pi \frac{\sin 2mx}{\sin x} dx$,

where m is a positive integer.

What is $I_2 + I_3$ equal to ?

A. 4

B. 2

C. 1

D. 0

Answer: D



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19. Consider the integral $I_m = \int_0^\pi \frac{\sin 2mx}{\sin x} dx$,

where m is a positive integer.

What is I_m equal to ?

A. 0

B. 1

C. m

D. $2m$

Answer: A



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20. Consider the integral $I_m = \int_0^\pi \frac{\sin 2mx}{\sin x} dx$,

where m is a positive integer.

Consider the following :

1. $I_m - I_{m-1}$ is equal to 0.

2. $I_{2m} > I_m$

Which of the above is/are correct ?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

Answer: A



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21. The area of the figure formed by the lines

$$ax + by + c = 0, ax - by + c = 0, ax + by - c = 0$$

and $ax - by - c = 0$ is

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

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

C. $\frac{c^2}{2ab}$

D. $\frac{c^2}{4ab}$

Answer: B



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22. The value of

$$\int_a^b \frac{x^7 + \sin x}{\cos x} dx \text{ where } a + b = 0 \text{ is}$$

A. $2b - a \sin(b - a)$

B. $a + 3b \cos(b - a)$

C. $\sin a - (b - a) \cos b$

D. 0

Answer: D



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23. The value of integral $\int_a^b \frac{|x|}{x} dx, a < b$ is :

A. $|b| - |a|$

B. $|a| - |b|$

C. $\frac{|b|}{|a|}$

D. 0

Answer: A



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24. $\int_0^{2\pi} \sin^5\left(\frac{x}{4}\right) dx$ is equal to

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

B. $\frac{16}{15}$

C. $\frac{32}{15}$

D. 0

Answer: C



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25. $\int_{-1}^1 x|x| dx$ is equal to

A. 0

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

C. 2

D. -2

Answer: A



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26. The area bounded by the coordinate axes and the curve $\sqrt{x} + \sqrt{y} = 1$, is

A. 1 square unit

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

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

D. $\frac{1}{6}$ square unit

Answer: D



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27. Consider the integrals

$$A = \int_0^{\pi} \frac{\sin x dx}{\sin x + \cos x}$$

and

$$B = \int_0^{\pi} \frac{\sin x dx}{\sin x - \cos x}$$

Which one of the following is correct ?

A. $A = 2B$

B. $B = 2A$

C. $A = B$

D. $A = 3B$

Answer: C



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28. Consider the integrals

$$A = \int_0^{\pi} \frac{\sin x dx}{\sin x + \cos x}$$

and

$$B = \int_0^{\pi} \frac{\sin x dx}{\sin x - \cos x}$$

What is the value of B ?

- A. $\frac{\pi}{4}$
- B. $\frac{\pi}{2}$
- C. $\frac{3\pi}{4}$
- D. π

Answer: B



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29. Consider the functions

$$f(x) = g(x) \text{ and } g(x) = \left[\frac{1}{x} \right]$$

Where $[\cdot]$ is the greatest integer function.

What is $\int_{\frac{1}{3}}^{\frac{1}{2}} g(x) dx$ equal to ?

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

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

C. $\frac{5}{18}$

D. $\frac{5}{36}$

Answer: B



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30. Consider the functions

$$f(x) = g(x) \text{ and } g(x) = \left[\frac{1}{x} \right]$$

Where $[\cdot]$ is the greatest integer function.

What is $\int_{\frac{1}{3}}^1 f(x) dx$ equal to ?

A. $\frac{37}{72}$

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

C. $\frac{17}{72}$

D. $\frac{37}{144}$

Answer: A



31. What is

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

equal to , where $[.]$ is the greatest integer function ?

A. 0

B. 1

C. 2

D. 4

Answer: C



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32. If $\int_{-2}^5 f(x)dx = 4$ and $\int_0^5 \{1 + f(x)\}dx = 7$, then what is $\int_{-2}^0 f(x)dx$ equal to ?

A. -3

B. 2

C. 3

D. 5

Answer: B



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33. What is $\int_0^{4\pi} |\cos x| dx$ equal to ?

A. 0

B. 2

C. 4

D. 8

Answer: D



34. What is the area bounded by the curves

$$|y| = 1 - x^2 ?$$

- A. $\frac{4}{3}$ square units
- B. $\frac{8}{3}$ square units
- C. 4 square units
- D. $\frac{16}{3}$ square units

Answer: B

35. If $\int_0^{\frac{\pi}{2}} \frac{dx}{3 \cos x + 5} = k \cot^{-1} 2$, then what is the value of K ?

A. $1/4$

B. $1/2$

C. 1

D. 2

Answer: B



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36. What is $\int_1^3 |1 - x^4| dx$ equal to ?

A. $-232/5$

B. $-116/5$

C. $116/5$

D. $232/5$

Answer: D



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37. What is $\int_0^{\frac{\pi}{4}} \frac{d\theta}{1 + \cos \theta}$ equal to ?

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

B. 1

C. $\sqrt{3}$

D. None of the above

Answer: B



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38. If $f(x)$ and $g(x)$ are continuous functions satisfying $f(x) = f(a - x)$ and

$g(x) + g(a - x) = 2$, then what is

$\int_0^a f(x)g(x)dx$ equal to ?

A. $\int_0^a g(x)dx$

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

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

D. 0

Answer: B



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39. Show that the triangle of maximum area that can be inscribed in a given circle is an equilateral triangle.

A. $\frac{3a^2}{4}$

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

C. $\frac{3\sqrt{3}a^2}{4}$

D. $\frac{\sqrt{3}a^2}{4}$

Answer: C



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40. What is $\int_{e^{-1}}^{e^2} |(\ln x)/(x)| dx$ equal to ?

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

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

C. 3

D. 4

Answer: B



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41. What is $\int_0^{2\pi} \sqrt{1 + \sin' \frac{x}{2}} dx$ equal to ?

A. 8

B. 4

C. 2

D. 0

Answer: A



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42. The area bounded by the curve $|x| + |y| = 1$ is

A. 1 square unit

B. $2\sqrt{2}$ square unit

C. 2 square unit

D. $2\sqrt{3}$ units

Answer: C



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43. Let $f(n) = \left[\frac{1}{4} + \frac{n}{1000} \right]$, where $[x]$ denote

the integral part of x . Then the value of $\sum_{n=1}^{1000} f(n)$

is

A. 251

B. 250

C. 1

D. 0

Answer: A



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44. The value of $\int_0^{\frac{\pi}{4}} \sqrt{\tan x} dx + \int_0^{\frac{\pi}{4}} \sqrt{\cot x} dx$ is equal to

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

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

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

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

Answer: D



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45. What is the area of the region bounded by the parabolas $y^2 = 6(x - 1)$ and $y^2 = 3x$?

A. $\frac{\sqrt{6}}{3}$

B. $\frac{2\sqrt{6}}{3}$

C. $\frac{4\sqrt{6}}{3}$

D. $\frac{5\sqrt{6}}{3}$

Answer: C



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46. Three sides of a trapezium are each equal to 6 cm. Let $\alpha \in \left(0, \frac{\pi}{2}\right)$ be the angle between a pair of adjacent sides.

If the area of the trapezium is the maximum possible, then what is α equal to ?

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

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

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

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

Answer: C



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47. Three sides of a trapezium are each equal to 6 cm. Let $\alpha \in \left(0, \frac{\pi}{2}\right)$ be the angle between a pair of adjacent sides.

If the area of the trapezium is maximum, what is the length of the fourth side ?

A. 8cm

B. 9 cm

C. 10 cm

D. 12 cm

Answer: D



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48. Three sides of a trapezium are each equal to 6 cm. Let $\alpha \in \left(0, \frac{\pi}{2}\right)$ be the angle between a pair

of adjacent sides.

What is the maximum area of the trapezium ?

A. $36\sqrt{3}cm^2$

B. $30\sqrt{3}cm^2$

C. $27\sqrt{3}cm^2$

D. $24\sqrt{3}cm^2$

Answer: C



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49. What is $\int_0^{\pi} e^x \sin x dx$ equal to ?

A. $\frac{e^\pi + 1}{2}$

B. $\frac{e^\pi - 1}{2}$

C. $e^\pi + 1$

D. $\frac{e^\pi + 1}{4}$

Answer: A



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50. What is $\int_1^e x \ln x dx$ equal to ?

A. $\frac{e + 1}{4}$

B. $\frac{e^2 + 1}{4}$

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

D. $\frac{e^2 - 1}{4}$

Answer: B



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51. What is $\int_0^{\sqrt{2}} [x^2] dx$ equal to (where $[.]$ is the greatest integer function) ?

A. $\sqrt{2} - 1$

B. $1 - \sqrt{2}$

C. $2(\sqrt{2} - 1)$

D. $\sqrt{3} - 1$

Answer: A



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52. What is the value of $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} (\sin x \times \tan x) dx$?

A. $-\frac{1}{\sqrt{2}} + \ln\left(\frac{1}{\sqrt{2}}\right)$

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

C. 0

D. $\sqrt{2}$

Answer: C



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53. If $\int_a^b x^3 dx = 0$ and $\int_a^b x^2 dx = \frac{2}{3}$ then what are the values of a and b respectively?

A. $-1, 1$

B. $1, 1$

C. $0, 0$

D. 2, - 2

Answer: A



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54. What is $\int_0^1 x(1-x)^9 dx$ equal to ?

A. $\frac{1}{110}$

B. $\frac{1}{132}$

C. $\frac{1}{148}$

D. $\frac{1}{240}$

Answer: A



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55. what is $\int_a^b [x]dx + \int_a^b [-x]dx$ equal to`

A. $b - a$

B. $a - b$

C. 0

D. $2(b - a)$

Answer: B



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56. What is $\int_2^8 |x - 5| dx$ equal to ?

A. 2

B. 3

C. 4

D. 9

Answer: D

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57. What is $\int_{-1}^1 \left\{ \frac{d}{dx} \left(\tan^{-1} \left(\frac{1}{x} \right) \right) \right\} dx$ equal to ?

A. 0

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

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

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

Answer: C



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58. $\int_0^{\frac{\pi}{2}} |\sin x - \cos x| dx$ is equal to

A. 0

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

C. $2\sqrt{2}$

D. $2(\sqrt{2} + 1)$

Answer: B



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59. $\int_0^{\pi/2} e^{\sin x} \cos x dx$ is equal to

A. $e + 1$

B. $e - 1$

C. $e + 2$

D. e

Answer: B



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60. What is the area of one of the loops between the curve $y = c \sin x$ and x - axis ?

A. c

B. $2c$

C. 3c

D. 4c

Answer: B



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