MATHS

BOOKS - PATHFINDER MATHS (BENGALI ENGLISH)

DEFINITE INTEGRATION

Question Bank

1. Evaluate: $\int_{-1}^{1} 5x^4\sqrt{x^5+1}dx$

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2. Evaluate: $\int_{0}^{1} \frac{\tan^{-1}x}{1+x^2}dx$

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3. Evaluate: $\int_0^{\frac{\pi}{2}} \sin^3 x \cos x dx$

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4. Evaluate : $\int_{-1}^{2} |x| dx$

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5. Evaluate : $\int_{-1}^{2} |x| dx$

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6. Evaluate : $\int_{-1}^{2} |x| dx$

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7. Evaluate : $\int_0^9 \{\sqrt{x}\}dx$, {x} represent fractional part of x. where $x \in R.$

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8. Evaluate: $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}}dx$

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9. Evaluate:If f(a-x)=f(x), then show that $\int_0^a xf(x)dx = \frac{a}{2}\int_0^a f(x)dx$

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10. Evaluate: $\int_{-1}^1 \log\left(\frac{2-x}{2+x}\right)dx$

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11. Evaluate: $\int_{-1}^{1} x^3 \sin^4 x dx$

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12. Evaluate: $\int_{0}^{\frac{\pi}{2}} \log \sin x dx$

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13. Evaluate : $\int_{-1}^{2} |x| dx$

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14. Evaluate: $\int_{0}^{4\pi} |\cos x| dx$

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15. Find the value of $\int \tan 3x \tan 2x \tan x dx$

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16. Find the points of local maximum and local minimumof the function $\int_0^{x^2} \frac{t^2 - 5t + 4}{2 + e^t} dt.$

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17. If $\int \frac{\sin x}{\sin(x - \alpha)} dx = Ax + B \log \sin(x - \alpha) + C$ then find the value of (A, B)

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18. Find $\int \frac{\cos 2x - \cos 2\alpha}{six - \sin \alpha} dx$

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19. Prove that : $1 \leq \int_0^1 e^{x^2} dx \leq e$

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20. Show that : $\frac{\pi}{6} \leq \int_0^1 \frac{dx}{\sqrt{4 - x^2 - x^3}} \leq \frac{\pi}{4\sqrt{2}}$

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21. Evaluate: $\lim_{n \to \infty} \left(\frac{1}{n+1} + \frac{1}{n+2} + ... + \frac{1}{2n} \right)$

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22. Evaluate : $\lim_{n \to \infty} \sum_{r=0}^{n-1} \frac{1}{\sqrt{4n^2 - r^2}}$

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23. Find $\int_0^2 (x^2 + 1)\, dx$

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24. Evaluate the following: $\int_0^{\frac{\pi}{4}} \cos^2 x\, dx$

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25. Evaluate the following: $\int_0^{\frac{\pi}{2}} \frac{dx}{1 + \cos x}$

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26. Evaluate the following: $\int_0^{\frac{\pi}{6}} \sin 2x \cos x dx$

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27. Evaluate the following: $\int_0^1 \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx$

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28. Evaluate the following: $\int_a^b \frac{|x|}{x} dx$

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29. Evaluate the following: $\int_0^{\frac{\pi}{3}} [\tan x] dx$

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30. Find the value of $\sqrt{2}\int_0^{100\pi}\sqrt{1-\cos 2x}dx$

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31. If $\int\frac{\cos^4 x}{\sin^2 x}dx = A\cot x + B\sin 2x + \frac{C}{2}x + D$, then find the value of B and C

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32. The value of $\int_0^{\frac{\pi}{2}}\frac{dx}{1+\tan^3 x}$ is

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33. $\int e^x(1+x)\sec^2(xe^x)dx = f(x)$+constant, then find f(x)

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34. If $\int \frac{e^x - 1}{e^x + 1} dx = f(x)$ +c, then find f(x).

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35. $\int x^2 e^{x^3} \cos\left(e^{x^3}\right) dx$ is equal to

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36. $\lim_{t \to a} \frac{\int_a^t f(x)dx - \left(\frac{t-a}{2}\right)(f(t) - f(a))}{(t-a)^3}$

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37. Evaluate : $\lim_{n \to \infty} \left(\frac{1^m + 2^m + \ldots + n^m}{n^{m+1}}\right)$

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38. Evaluate:

$$\lim_{n\to\infty}\left[\left(\frac{1}{n^2}\sec^2\left(\frac{1}{n^2}\right)+\frac{2}{n^2}\sec^2\left(\frac{4}{n^2}\right)....+\frac{1}{n}\sec^2(1)\right]\right.$$

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39. The value of

$$\lim_{n\to\infty} n\left\{\frac{1}{3n^2+8n+4}+\frac{1}{3n^2+16n+16}+....+\to nterms\right\}$$

is equal to

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40. The value of

$$\lim_{n\to\infty}\frac{1}{n^2}\left\{\frac{\sin^3(\pi)}{4n}+2\frac{\sin^3(2\pi)}{4n}+...+n\frac{\sin^3(n\pi)}{4n}\right\}$$ is equal to

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41. The value of $\frac{n!}{(n-2)!}$ ia

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42. The value of $\int_{-2}^{2} \frac{\sin^2 x}{\left[\frac{x}{\pi}\right] + \frac{1}{2}} dx$ where [x] denotes the greatest integer $\leq x$ is

A. 1

B. 0

C. 4-sin 4

D. none of these

Answer: B

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43. If $I = \int_{\frac{\pi}{6}}^{\frac{\pi}{6}} \frac{\pi + 4x^5}{1 - \sin\left(|x| + \frac{\pi}{6}\right)} dx$ then I equals

A. 4π

B. $2\pi + \frac{1}{\sqrt{3}}$

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

D. $4\pi + \sqrt{3} - \frac{1}{\sqrt{3}}$

Answer: A

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44. $I = \int_{-2}^{2} \left(\left|1 - x^4\right|\right) dx$ then I equals

A. 6

B. 8

C. 12

D. 21

Answer:

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45. $I = \int_{-1}^{1} \left(\left[x^2 \right] + \log \left(\frac{2+x}{2-x} \right) dx \ldots . (1) \right.$ where [x] denotes the greatest integer $\leq x$then I equals

A. (-2)

B. (-1)

C. 0

D. 1

Answer: C

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46. if f(x) is a function such that f(x+k)=f(x) for $K \in I^+$ and $I = \int_0^k f(x)dx$then $I = \int_0^{k^{2-k}} f(x)dx$ is equal to

A. Ki

B. $\left(k^2 - 3\right)I$

C. $\left(K^2 - K\right)I$

D. $(K-1)I$

Answer: D

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47. let $T \leq 0$ be a fixed real number suppose f is continuous function such that for all $x \in Rf(x+T) = F(x)$ if $I = \int_0^T f(x)dx$then the value of $\int_3^{3+3T} f(2x)dx$ is

A. 3/2I

B. 2I

C. 3I

D. 6I

Answer: C

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48. if $I = \int_0^{\frac{\pi}{2}} \frac{\sin 8x \log(\cot x)}{\cos 2x} dx$ then I equals

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

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

C. (-1/3)

D. 0

Answer: D

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49. if $I = \int_{\frac{1}{3}}^{3} \frac{1}{x} \sin\left(\frac{1}{x} - x\right) dx$ then I equals

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

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

C. 0

D. none of these

Answer: C

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50. if $b > a$ and $I = \int_{a}^{b} \frac{dx}{\sqrt{(x-a)(b-x)}}$ then I equals

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

B. π

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

D. 2π

Answer: B

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51. if $I = \int_0^{\frac{\pi}{2}} \frac{dx}{5 + 3\sin x} = \lambda \tan^{-1}\left(\frac{1}{2}\right)$ then value of λ is

A. 1

B. 44198

C. 44199

D. 44200

Answer: B

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52. if $I = \int_{\frac{1}{e}}^{e} |\log x| \frac{dx}{x^2}$ then I equals

A. 2

B. 2/e

C. 2(1-1/e)

D. 0

Answer: C

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53. The natural number $n \leq 5$ for which $I_n = \int_0^1 e^x (x-1)^n dx = 16 - 6e$ is

A. 2

B. 3

C. 4

D. 5

Answer: B

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54. if $I = \int_0^a \sqrt{\frac{a-x}{a+x}} dx, a > 0$ Then I equals

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

B. $\frac{a}{2}(\pi - 1)$

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

D. $a\left(\frac{\pi}{2}-1\right)$

Answer: D

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55. Evaluate: $\int_0^{\frac{\pi}{2}} \sin^3 x \cos x dx$

A. 2^{-n+1}

B. 2^{-n-1}

C. 2^{-n}

D. 2^{-1}

Answer: C

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56. let f(x) be a continuous function such that f(a-x)+f(x)=0 for all $x \in [0, a]$ then $\int_0^a \frac{dx}{1+e^{f(x)}}$ is equal to

A. a

B. a/2

C. f(a)

D. f(a)/2

Answer: B

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57. If $f(x) \geq 0$ for all $x \in [0, 10]$ and $\int_0^8 f(x)dx = 0$ then f(7) is

A. 0

B. 1

C. 7

D. 10

Answer: A

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58. if $\int_0^{f(x)} tdt = \pi cos\pi x$ then f(4) is equal to

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59. if $I_n = \int_0^{\frac{\pi}{4}} \tan^n \theta . d\theta, then n \in N, n(I_{n-1} + I_{n+1})$ equals

A. 1

B. 2

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

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

Answer: A

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60. $\int_0^{\frac{\pi}{4}} \sin x d(x - [x])$ is equal to

A. 44198

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

C. 1

D. none of these

Answer: B

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61. The value of $\int_0^{\sin^2 x} \sin^{-1}\left(\sqrt{t}\right) dt + \int_0^{\cos^2 x} \cos^{-1}\left(\sqrt{t}\right) dt$ is

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

B. 0

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

D. none of these

Answer: A

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62. value of $\lim_{n \to \infty} \left(\frac{n!}{n^n}\right)^{\frac{1}{n}}$, $wheren \in N$ is equal to

A. e

B. 1/e

C. e^2

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

Answer: B

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63. $\int_{-1}^{1} \max(2-x, 2, 1+x)dx$ is

A. 4

B. (9/2)

C. 2

D. none of these

Answer: B

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64. The value of $\int_{-1}^{2} |[x] - \{x\}| dx$ where [x] is the greatest integer less then or equal to x and {x} is the fractional part of x is

A. (7/2)

B. (5/2)

C. (1/2)

D. (3/2)

Answer: A

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65. if $I = \int_{0}^{1.7} \left[x^2\right] dx$ then I equals`

A. $2.4 + \sqrt{2}$

B. $2.4 - \sqrt{2}$

C. $2.4 + \frac{1}{\sqrt{2}}$

D. $2.4 - \frac{1}{\sqrt{2}}$

Answer: B

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66. $\int_{-1}^{1} (x - |2x|)dx$ is equal to

A. 1

B. 0

C. -2

D. 4

Answer:

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67. $\int_0^3 (|x| + |x-1|)dx$ is equal to

A. 9

B. 10

C. 8

D. none of these

Answer:

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

A. 16

B. 14

C. 19

D. none of these

Answer: C

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69. Evaluate: $\lim_{n \to \infty} \left(\frac{1}{n+1} + \frac{1}{n+2} + ... + \frac{1}{2n} \right)$

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70. The value of $\int_0^{2n\pi} [\sin x + \cos x] dx$ is equal to

A. `(-npi)

B. $n\pi$

C. $(-2n\pi)$

D. none of these

Answer: A

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71. the value of $\int_{\frac{\pi}{2}}^{3\frac{\pi}{2}} [2\sin x]dx$, is [.] greatest integer function

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

B. b) $\left(-\frac{\pi}{2}\right)$

C. c) 0

D. d) none of these

Answer: A

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72. if $\int_0^1 f(x)dx = 1, \int_0^1 xf(x)dx = a$ and $\int_0^1 x^2 f(x)dx = a^2$, $then \int_0^1 (a-x)^2 f(x)dx$ is equal to

A. $2a^2$

B. $4a^2$

C. 0

D. none of these

Answer: C

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73. if $f(x) = -\int_0^x \log(\cos t)dt$, then the value of $f(x) - 2f\left(\frac{\pi}{4} + \frac{x}{2}\right) + 2f\left(\frac{\pi}{4} - \frac{x}{2}\right)$ is equal to

A. (-xlog2)

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

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

D. none of these

Answer: A

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74. if $\int_0^{\pi}\left(\frac{x}{1+\sin x}\right)^2 dx = A$, then $\int_0^{\pi}\frac{\left(2x^2\right).\left(\cos^2\left(\frac{x}{2}\right)\right)}{\left(1+\sin x\right)^2}$ is equal to

A. $A + 2\pi - \pi^2$

B. $A - 2\pi + \pi^2$

C. $2\pi - A - \pi^2$

D. none of these

Answer: A

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75. If $\int \frac{\sin^4 x}{\cos^8 x} dx = a \tan^7 x + b \tan^5 x + c$ then find the relation between a and b

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76. The value of x satisfying $\int_0^{2[x+14]} \left\{\frac{x}{2}\right\} dx = \int_0^{\{x\}} [x+14] dx$ is equal to (where[.] and{.} denotes the greatest integer and fractional part of x

A. [-14,-13]

B. (0,1)

C. (-15,-14)

D. none of these

Answer: A

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77. if $n > 1$and $I = \int_0^{\infty} \frac{dx}{\left(x + \sqrt{1 + x^2}\right)^n}$ then I equals

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

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

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

D. $\sqrt{n}^2 - 1$

Answer: A

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78. If [x] denotes the greatest integer $\leq x$ and $n \in N$ then value of $I_n = \int_0^{n^2} [\sqrt{x}]\, dx$ is

A. 1/6(n-1)n(4n+1)

B. $\frac{1}{6}(n-1)n^2(2n+1)$

C. 1/6(n-1)(n)(2n-1)

D. 1/6(n-1)(3n+5)

Answer: A

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79. if $I = \int_0^1 \frac{dx}{(1+x)(2+x)\sqrt{x}(1-x)}$ then I equals

A. 2π

B. π

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

D. $\frac{\pi}{\sqrt{6}}(\sqrt{3}-1)$

Answer: D

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80. if $\int_0^1 x(1-x)^{2007/2}dx$ then it equals

A. 2007/2

B. 2011/2

C. 2009/2

D. none of these

Answer: D

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81. if $I = \int_{-1}^{2} |x \sin \pi x| dx$ then I equals

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

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

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

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

Answer: D

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82. if $I = \int_{\alpha}^{\beta} \left[\log \log x + \frac{1}{(\log x)^2} \right] dx$ then I equals

A. $\alpha \log \alpha - \beta \log \log \beta$

B. $\frac{1}{\alpha} - \frac{i}{\beta} + \log \log \beta$

C. $\beta - \frac{\alpha}{\alpha\beta} \alpha \log \log \alpha - \beta \log \log \beta$

D. none of these

Answer: D

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83. if $I = \int_0^{\frac{\pi}{4}} \frac{\sin 2\theta}{\sin^2\theta + \cos^4\theta} d(\theta)$ then I equals

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

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

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

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

Answer: D

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84. if $0 < \alpha < 1$ and $I = \int_{-1}^{1} \frac{dx}{\sqrt{1 - 2\alpha x + \alpha^2}}$ then I equals

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

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

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

D. none of these

Answer: D

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85. if $I = \int_{8}^{15} \frac{dx}{(x-3)\sqrt{x+1}}$ then I equals

A. 1/2log(5/3)

B. 2log(1/3)

C. 1/2log(1/5)

D. 2log(5/3)

Answer: A

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86. $\lim_{x \to (\pi/4)} \frac{\int_2^{\sec^2 x} (f(t)dt)}{x^2 - \frac{(\pi)^2}{16}}$ equals

A. $\frac{8}{\pi} f(2)$

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

C. $\frac{2}{\pi} f\left(\frac{1}{2}\right)$

D. 4f(2)

Answer: A

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87. If $\int_1^{\infty} \frac{(x^3+3)dx}{x^6(x^2+1)} = \frac{a+b\pi}{c}$, then

A. a=40-6 In2

B. b=-9

C. c=12

D. a=40-3 In2

Answer: A::B::C

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88. If $\int_0^1 \frac{(1-x^2)dx}{1+x^2+x^4} = aInb$ then,

A. a=2

B. a=1/2

C. b=3

D. none of these

Answer: B::C

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89. If $f(x) = \int_{-2}^{x} |t+1| dt$ then,

A. f(x) is continous in [(-3/2),1]

B. f(x) is differentiable in [(-3/2),1]except x=(-1)

C. f(x)is continous in](-3/2),1]

D. f(x)is differentiable in](-3/2),1{

Answer: A::B

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90. Let f(x)be a function satisfying f(x)=f(x) with f(0)=1 and 'g' be the function satisfying $f(x) = g(x) = x^2$ the value of the integral $\int_0^1 f(x)g(x)dx$ is

A. 1/4(e-7)

B. 1/4(e-2)

C. 1/2(e-3)

D. none of these

Answer: D

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91. Let $I_n = \int_0^{\frac{\pi}{4}} \tan^n x dx,$ then $\frac{1}{I_2 + I_4}, \frac{1}{I_3 + I_5}, \frac{1}{I_4 + I_6}, \frac{1}{I_5 + I_7}$

A. Are in AP

B. Are in Gp

C. Common difference=1

D. Common ratio=(-1)

Answer: A::C

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92. The maximum and minimum values of the integral $\int_0^{\frac{\pi}{2}} \frac{dx}{1+\sin^2 x}$ are

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

B. π

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

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

Answer: A::C

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93. Let $f(x) = \int_0^x |\sin t| dt$, then

A. f is continous everywhere

B. f(x) is differentiable at $x = \pi$

C. $f(\pi) = 2$

D. f $f(x) \geq 0$ for all x

Answer: A::C::D

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94. The value of $\int (\pi \sin mx \sin nx dx (m, n \in N)$ is equal to for limits-pi to pi

A. 0

B. $\int_{\frac{\pi}{8}}^{\frac{\pi}{8}} x^8 \sin^9 x dx$

C. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin x f(\cos x) dx$

D. $\int \left(-\frac{1}{2}\right)^{\frac{1}{2}} e^{\cos x} dx$

Answer: A::B::C

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95. The value of $\int_{\frac{1}{e}}^{\tan x} \frac{tdt}{1+t^2} + \int_{\frac{1}{e}}^{\cot x} \frac{dt}{t(1+t^2)}$ is

A. $\frac{1}{2+\tan^2 x}$

B. 1

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

D. $\frac{2}{\pi} \int (-1)^1 \frac{dt}{1+t^2}$

Answer: B::D

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96. If $\frac{2x}{\pi} < \sin x < x$ for $0 < x < \left(\frac{\pi}{2}\right)$, the the value of the integral $\int_0^{\frac{\pi}{2}} \frac{\sin x}{x} dx$ is

A. > 1

B. < 1

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

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

Answer: A::D

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97. Definite integral of any discontinuous or non differentiable function is normally done by the usage of the property

$\int_a^b f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx$,where$c \in (a, b)$is the point of discontinuity or non diffrentiability

The value of $I = \int_1^{100} \left[\sec^{-1} x\right] dx$,(where[.]denotes greatest integer function)is equal to

A. sec1

B. 100-sec1

C. 0.99-sec1

D. none of these

Answer: 2

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98. Definite integral of any discontinuous or non diffrentiable function is normally done by the usage of the property $\int_a^b f(x)dx = \int_a^b f(x)dx + \int_c^b f(x)dx$,where$c \in (a, b)$,

$\int_1^{\infty} [\cos ec^{-1}x]dx$ (where[.] denotes greatest integer function)is equal to

A. 1-cosec1

B. cosec1-1

C. 1-sin1

D. none of these

Answer: 2

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99. if m and M are the smallest and greatest values of a function f(x)defined on an interval [a,b] then $m(b-a) \leq \int_a^b f(x)dx \leq M(b-a)$,Again(i) $f(x) \geq 0 on [a,b] \Rightarrow \int_a^b f(x)dx \geq 0$

$f(x) \leq g(x)$, f(x)leg(x) on[a,b]impliesint_a^bf(x)dxleint_a^bg(x)dx,

$a \leq \int_0^1 e^{x^2} dx \leq b$then (a,b)is

A. $(1, e^2)$

B. (1,e)

C. (e^{-1}, e)

D. (e, e^2)

Answer: 2

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100. if m and M are the smallest and greatest values of a function f(x) defined on an interval [a,b]then

$m(b-a) \leq \int_a^b f(x)dx \leq M(b-a)$,(i)

$f(x) \geq 0, [a, b] \Rightarrow \int_a^b f(x)dx \geq 0$

$f(x) \leq g(x)$, f(x)leg(x)[a,b]impliesint_a^bf(x)dxleint_a^bg(x)dx, Let

g(x)=int_0^xf(t)dt$where$1/2lef(t)le1, tin[0,1] and 0lef(t)le1/2f or tin[1,2]` then

A. $-\frac{3}{2} \leq g(2) < \frac{1}{2}$

B. $0 \leq g(2) < 2$

C. $-\frac{3}{2} < g(2) \leq \frac{5}{2}$

D. $2 < g(2) < 4$

Answer: 2

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101. let $F(x) = \int_0^x \frac{2t \div 1}{t^2 - 2t + 2} dt, x \in [-1, 1]$ then

1. Let $F(x) = \int_0^x \frac{2t+1}{t^2-2t+2} dt$, $x \in [-1, 1]$ then

List - I	List - II
(1) $F(x) < 2$ for x in	(P) $[-1, 0)$
(2) $F(x) > \frac{4-3\pi}{4}$ for x in	(Q) $\left[-1, -\frac{1}{2}\right]$
(3) F increases on	(R) $\left[-\frac{1}{2}, 1\right]$
(4) F decreases on	(S) $[-1, 1]$

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2. Match List - I with List - II

List - I	List - II
(1) $\int_0^{\pi} x \log \sin x \, dx$	(P) $\left(\frac{\pi}{8}\right)\log 2$
(2) $\int_0^{\infty} \log\left(x+x^{-1}\right)\frac{dx}{1+x^2}$	(Q) $-\frac{\pi^2}{2}\log 2$
(3) $\int_0^{\pi/4} \log(1+\tan x)\,dx$	(R) $-\pi \log 2$
(4) $\int_0^{\pi} \log(1-\cos x)\,dx$	(S) $\pi \log 2$

102.

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103. $I = \int_0^2 x[2x]dx$ where [.] denotes the greatest integer function then the value of 16/17I must be

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104. If $\frac{\pi}{2} < \alpha < \frac{2\pi}{3}$ and $I = \int_0^{\sin 2\alpha} \frac{dx}{\sqrt{4\cos^2\alpha - x^2}}$ then the value of $\frac{I+\alpha}{\pi}$must be

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105. if $\int_0^{x^2(1+x)} f(t)dt = x$ then the value of 10f(2) must be

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106. $f(x) = \int_1^x \frac{\log t}{1+t+t^2} dt (x \geq 1)$ then prove that f(x) =f(1/x)

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107. $\int_{-\pi/4}^{\pi/4} \frac{\sec^2 x dx}{1+e^x}$

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108. Evaluate $\int_0^1 \left(\frac{x-1}{x+1}\right)^{\frac{1}{2}} dx$

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109. The value of $\frac{\int_0^n [x]dx}{\int_0^n \{x\}dx}$ is (where [x] and {x} denotes the integral part and fractional part functions of x and $x \in N$)

A. n+2

B. n+1

C. n

D. n-1

Answer:

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110. Evaluate: $\int_0^{\frac{\pi}{2}} \frac{(\sin x + \cos x)^2}{(1+\sin 2x)^{\frac{1}{2}}} dx$

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111. Find the solution for x of the equation $\int_{2^{\frac{1}{2}}}^{x} \frac{1}{t(t^2-1)^{\frac{1}{2}}} dt = \frac{\pi}{2}$.

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112. If $I_1 = \int_e^{e^2} \frac{dx}{\log x}$ and $I_2 = \int_1^2 \frac{e^x}{x} dx$, then find relation between I_1 and I_2

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113. If $\int_0^a \frac{dx}{1+4x^2} = \frac{\pi}{8}$, then find the value of a.

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114. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\cos x}{(1+\sin x)^2} dx$

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115. Evaluate: $\int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \frac{dx}{1+\cos x}$

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116. $\int_{-\frac{\pi}{3}}^{\frac{\pi}{3}} \frac{(x \sin x) dx}{\cos^2 x}$ is

A. $\frac{4\pi}{3} - \frac{2 \log \tan(5\pi)}{12}$

B. $\frac{4\pi}{3} - 2\frac{\log \tan(5\pi)}{12}$

C. $\frac{4\pi}{3} + \frac{\log \tan(5\pi)}{12}$

D. none of these

Answer: B

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117. The value of $\int_{-3}^{3}\left(ax^5+bx^3+cx+k\right)dx$ where a,b, c, k are constant depends only on

A. a and k

B. a and b

C. a b, and c

D. k

Answer: D

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118. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin|x|dx$ is equal to

A. 0

B. 1

C. 2

D. π

Answer: C

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119. If f(x) is defined on [2,2] by f(x) $=4x^2 - 3x + 1$ and g(x) = $\frac{f(-x) - f(x)}{x^2 + 3}$ then $\int_{-2}^{2} g(x)dx$ is equal to

A. 64

B. (-48)

C. 0

D. 24

Answer: C

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120. $I = \int_{-\pi}^{\pi} \frac{e^{\sin x} dx}{e^{\sin x} + e^{-\sin x}}$ then I equals

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

B. 2π

C. π

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

Answer: C

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121. If $I = \int_0^{100\pi} \sqrt{1 - \cos 2x}\, dx$ then the value I is :

A. $100\sqrt{2}$

B. $200\sqrt{2}$

C. $50\sqrt{2}$

D. none if these

Answer: B

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122. $\int_0^{1000} e^{x - [x]}\, dx$ is equal to

A. $\frac{e^{1000} - 1}{e - 1}$

B. $\frac{e^{1000} - 1}{1000}$

C. (e-1)/1000

D. 1000(e-1)

Answer: D

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

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

A. 3/2

B. 2

C. 1

D. none of these

Answer: A

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125. $I = \int_0^{\frac{\pi}{2}} \frac{dx}{1+\tan^3 x}$ is equal to

A. π

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

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

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

Answer: C

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126. $\int_0^2 \frac{\sin(\pi x)}{2}\Big) dx$ is equal to

A. 1

B. (-1)

C. 0

D. none of these

Answer:

Watch Video Solution

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

A. 0

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

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

D. π

Answer: D

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128. $\int_0^1 \tan^{-1}\left(\frac{2x-1}{1+x-x^2}\right)dx$ is equal to

A. 1

B. 0

C. (-1)

D. none of these

Answer: B

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129. $\int_{-3}^{2}[|x+1|+|x+2|+|x-1|]dx$ is equal to

A. 31/2

B. 35/2

C. 47/2

D. 39/2

Answer: C

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130. find $\int_{o}^{\frac{\pi}{4}} \sin x dx$=?

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131. The value of $\int_{-1}^{3} [|x-2|+[x]]dx$ where [] denotes GiF is

A. 7

B. 5

C. 4

D. 3

Answer: A

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132. Evaluate:

$$\lim_{n\to\infty}\left[\left(\frac{1}{n^2}\sec^2\left(\frac{1}{n^2}\right)+\frac{2}{n^2}\sec^2\left(\frac{4}{n^2}\right)....+\frac{1}{n}\sec^2(1)\right]\right.$$

A. 1/2tan 1

B. tan 1

C. 1/2 cosec1

D. 1/2 sec1

Answer: A

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133. `integral 0 to pi xf(sinx) dx is equal to

A. $\pi \int_0^{\pi} f(\sin x)dx$

B. $\left(\frac{\pi}{2}\right) \int_0^{\frac{\pi}{2}} f(\sin x)dx$

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

D. $\pi \int_0^{\pi} f(\cos x)dx$

Answer: C

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134. If for x =0 af(x) +bf(1/x)=1/x-5 where $a \neq b$ then $\int_1^2 xf(x)dx$ is equal to

A. $\frac{b-9a}{9(a^2-b^2)}$

B. $\frac{b-9a}{b(a^2-b^2)}$

C. $\frac{b-9a}{6(a^2-b^2)}$

D. none of these

Answer: D

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135. If $x^2 f(x) + f\left(\frac{1}{x}\right) = 2$ for all x except at x=0 then $\int_{\frac{1}{3}}^{3} f(x)dx =$

A. 44289

B. 44411

C. 44199

D. none of these

Answer: B

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136. $\int_0^{\frac{\pi}{2}} e^x dx$ is equal to

A. `(e^(pi/2)-1)

B. `(e^(pi/2)+1)

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

D. none of these

Answer: A

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137. The value of $\int_1^2 [2x^2 - 3] dx$ where [] denotes GIF is

A. 4

B. $\sqrt{-\frac{3}{2}}+\sqrt{2}+\sqrt{3}-10$

C. $9-\left(\sqrt{\frac{3}{2}}+\sqrt{2}+\sqrt{\frac{5}{2}}+\sqrt{3}+\sqrt{\frac{7}{2}}\right.$

D. $15-\sqrt{\frac{3}{2}}-\sqrt{2}-\sqrt{\frac{5}{2}}-\sqrt{3}-\sqrt{\frac{7}{2}}-\sqrt{\frac{9}{2}}$

Answer: C

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138. The value of $\int_a^b \frac{|x|}{x}dx$, $a<b<0$ is :

A. b-a

B. a-b

C. a+b

D. $|b|-|a|$

Answer: D

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139. If $\int_x^{x+1} f(t)dt = [x]$ then th value of $\int_{-2}^{4} f(x)dx$ is equal

A. 1

B. 2

C. (-2)

D. 3

Answer: D

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140. Find the value of $\int_0^2 \left|x^2 + 2x - 3\right| dx.$

A. 4

B. 6

C. 3

D. 2

Answer: D

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141. The value of $\int_0^{1.5} [x^2] dx$ is : where [x] denotes greatest integer function.

A. $(2 - \sqrt{2})$

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

C. $(5 + \sqrt{5})$

D. none of these

Answer: A

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142. Let $I_n = \int_0^{\frac{\pi}{4}} \tan^n x dx$, then $\frac{1}{I_2 + I_4}, \frac{1}{I_3 + I_5}, \frac{1}{I_4 + I_6}, \frac{1}{I_5 + I_7}$

A. 44200

B. 44198

C. 44204

D. none of these

Answer: A

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143. If $\int_{-1}^{4} f(x)dx = 4$ and $\int_{2}^{4} [3 - f(x)]dx = 7$ then the value of $\int_{-1}^{2} f(x)dx$ is

A. (-2)

B. 0.3

C. 0.4

D. 0.5

Answer: D

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144. if $I_{10} = \int_{0}^{\frac{\pi}{2}} x^{10} \sin x dx$ then the value of $I_{10} + 90I_8$ is

A. $10\left(\frac{\pi}{2}\right)^3$

B. $10\left(\frac{\pi}{2}\right)^9$

C. $\left(\frac{\pi}{2}\right)$

D. 0

Answer: B

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145. If $a_n = \int_0^{\frac{\pi}{4}} \cot^n x dx$ then $a_2 + a_4, a_3 + a_5, a_4 + a_6$

A. G.P.

B. A.P.

C. H.P.

D. none of these

Answer: C

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146. The value of $\int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} \sqrt{4-4\sin^2 t}dt$

A. 0

B. 2

C. 1

D. none of these

Answer: D

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147. $\int_0^{\infty} \left[\frac{2}{\ln x}\right] dx$ where [] denotes the greatest integer equals

A. $In2$

B. l^2

C. 0

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

Answer: A

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148. if `int_2^e [(1/logx)-(1/(logx)^2)] dx=a+(b/log2)' then

A. a=l , b=2

B. a=l , b=2

C. a=(-l) , b=2

D. none of these

Answer: A

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149. If $I = \left| \int_2^6 \frac{\sin x dx}{1+x^2} \right|$ then

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

B. I lies in the interval (1/4, 1/5)

C. I lies in the interval (1/5, 1/6)

D. $I \leq \frac{3}{10}$

Answer: D

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150. Let f(x) = $\int_{-1}^{x} |x+1| dx$ then

A. f(x) is continous in (-1,1)

B. f(x) is differentiable in (-1,1)

C. f'(x) is continous in (-1,1)

D. All of the above

Answer: D

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151. If a continous function f satisfies $\int_0^{f(x)} t^2 dt = x^2(1+x)$ for all $x \geq 0$ then f(2) is equal to

A. 12

B. $\sqrt[3]{36}$

C. 3

D. $\sqrt[3]{42}$

Answer: B

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152. The value of $\int_0^{\sin^2 x} \sin^{-1}(\sqrt{t})\,dt + \int_0^{\cos^2 x} \cos^{-1}(\sqrt{t})\,dt$ is

A. 0

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

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

D. none of these

Answer: B

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153. A line tangent to the graph of the function y=f(x) at the pointx =a forms an angle $\frac{\pi}{3}$ with y axis abd at x=b and $\frac{\pi}{4}$ with x-axis then $\int_a^b f''(x)dx$

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

B. (-pi/12)`

C. (pi/12)

D. $\sqrt{3}-1$

Answer: A

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154. The value of $\int_0^{\frac{\pi}{2}} \log(\tan x)dx$ is

A. 0

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

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

D. none of these

Answer: C

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155. $\int_{\frac{\pi}{2}}^{3\frac{\pi}{2}} [2\sin x]dx$ is equal to [x] denotes the greatest integer function

A. $-\pi$

B. 0

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

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

Answer: C

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156. The value of the integral $\int_0^3 \frac{dx}{\left(\sqrt{x+1}+\sqrt{5x+1}\right)}$ is

A. 44515

B. 14/15

C. 44232

D. none of these

Answer: D

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157. The solution of the equation $\int_{\sqrt{2}}^{x} \frac{dx}{x\sqrt{x^2-1}} = \frac{\pi}{12}$ is given by

A. 1

B. 2

C. 3

D. $\sqrt{3}$

Answer: B

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158. The value of $\int_{\frac{1}{e^2}}^{e} |\log x| dx$ is

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159. The integral $\int_0^{\frac{\pi}{2}} \frac{dx}{x + \sqrt{a^2 - x^2}}$ equals

A. π

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

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

D. none of these

Answer: A

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160. If $I = \int_0^{\frac{\pi}{4}} \log(1 + \tan x)dx$ then I is equal to

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

B. $\frac{\pi}{4}\log_e 2$

C. $-\frac{\pi}{8}\log_e 2$

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

Answer: C

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161. The value of $\int_{\in 2}^{\sqrt{\in 3}} \frac{x\sin x^2}{\sin x^2 + \sin(In6 - x^2)dx}$ is

A. 1/4In3/2

B. 1/2In3/2

C. In3/2

D. 1/6In3/2

Answer: A

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162. The value of $\int_0^1 \frac{8\log(1+x)}{1+x^2}dx$ is

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

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

C. $\log 2$

D. $\pi \log 2$

Answer: D

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163. Th value of $\int_{-2}^{2}(x\cos x+\sin x+1)dx$ is

A. 2

B. 0

C. (-2)

D. 4

Answer: D

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164. $\int_{\pi}^{16\pi}|\sin x|dx=$

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165. The value of $\lim_{n\to\infty}\sum_{r=1}^{n}\frac{r^3}{r^4+n^4}$ is

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

B. $\frac{1}{4}\left(\log_e\left(\frac{1}{2}\right)\right.$

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

D. $\frac{1}{2}(\log_e)2$

Answer: C

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166. The value of $\int_0^{\pi} \sin^{50} x \cos^{49} x dx$ is

A. 0

B. `(pi/4)

C. `(pi/2)

D. 1

Answer: A

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167. 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. $I_4 > I_3$

B. $I_4 < I_3$

C. $I_1 > I_2$

D. $I_1 < I_2$

Answer: A::C

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168. The interval in which f(x) defined by $f(x) = \int_{-1}^{x} (t^2 + 2t)(t^2 - 1)\,dt$ increases

A. $(-\infty, -2)$

B. $(1, \infty)$

C. (-1,0)

D. $(2, \infty)$

Answer: A::B::C

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169. Let f be an odd continous function which is periodic with priod 2 if g(x) = $\int_{0}^{x} f(t)\,dt$ then

A. g(x) is even

B. g(n)=0, $n \in N$

C. g(2n)=0 $n \in N$

D. g(x) is periodic

Answer: A::C::D

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170. Let f(x) = $\int_{-2}^{x} |x+1| dx$ then

A. f(x) is continous in (-1,1)

B. f(x) is differentiable in (-1,1)

C. f'(x) is differentiable in (-1.1)

D. none of these

Answer: A::B::C

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171. Let $I = \int_0^{\frac{\pi}{2}} \frac{\sin x dx}{x}$ then

A. $I > 1$

B. $I > \left(\frac{\pi}{2}\right)$

C. $I > \left(\frac{\pi}{2}\right)$

D. $I < 1$

Answer: A::C

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172. If $I = \int_0^{\frac{\pi}{2}} \frac{dx}{\sqrt{1+\sin^3 x}}$ then

A. $0 < I < 1$

B. $I > \left(\frac{\pi}{2\sqrt{2}}\right)$

C. $I < \sqrt{2}\pi$

D. $I > 2\pi$

Answer: B::C

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173. `int_0^pi xf(sinx)dx is equal to

A. $\frac{\pi}{2}\int_0^{\pi} f(\sin x)dx$

B. $\pi\int_0^{\frac{\pi}{2}} f(\sin x)dx$

C. $2\pi\int_0^{\frac{\pi}{2}} f(\sin x)dx$

D. none of these

Answer: A::B

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174. Let f(x) = $\{1-|x|, |x| \leq 10, |x| > 1$ and g(x) =f(x-1) +f(x+1) $\xi nR, thenvalueofint\_(-3)\hat{}3$ g(x) dx` is equal to

A. 2

B. 3

C. period of h(x) =$\sin \pi x$

D. period of $\phi(x) = \cos(2\pi x)$

Answer: A::C

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175. The values of α which satisfy $\int_{\frac{\pi}{2}}^{\alpha} \sin 2\alpha (\alpha \in [0, 2\pi]$ are equal to

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

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

C. $\frac{7\pi}{6}$

D. $\frac{11\pi}{6}$

Answer: A::B::C::D

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176. Let f(x) = $\int_2^x f\left(t^2-3t+2\right)dt$ then

A. f'(2)=0

B. f(-2)=0

C. f(2)=0

D. f'(2)=2

Answer: A::C

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177. Let f(x) be a continous function defined on the closed interval [a,b] then $\lim_{n\to\infty}\sum_{r=1}^{n}\frac{1}{n}f\left(\frac{r}{n}\right)=\int_0^1 f(x)dx$

The value of $\lim_{n\to\infty}\left(\frac{1}{n}\right)\left[\left(\frac{1}{n+1}\right)+\frac{2}{n+2}+.....+\frac{1}{2}\right\}$ is

A. 5-2 In2

B. 4-2 In2

C. 3-2 In 2

D. 1- In 2

Answer: C

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178. Let f(x) be a continous function defined on the closed interval [a,b] then $\lim_{n\to\infty}\sum_{r=0}^{n-1}\frac{1}{n}f\left(\frac{r}{n}\right)=\int_0^1 f(x)dx$

The value of $\lim_{n\to\infty}\sum_{r=1}^{n}\left(1+\left(\frac{r}{n}\right)\right)\left(\frac{1}{n}\right)$ is

A. 3/2

B. 2

C. 1

D. 2/e

Answer: B

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179. If f(x) be an increasing function defined on [a,b] then max {f(t) $a\le tx, a\le x\le b\}=f(x)$ and $\min\{f(t)$aletlex, alexleb}

$= f(b)$ and if $f(x)beadecrea\sin gfunctiondef \in edon[a, b]$

lim_0^3min{1,absx,abs(x-2)} dx ` is equal to

A. 1

B. 44257

C. 2

D. 44318

Answer: B

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180. If f(x) be an increasing function defined on [a,b] then max {f(t) $a \leq tx, a \leq x \leq b\} = f(x)$ and $\min\{f(t)$aletlex, alexleb} $= f(b)$ and if $f(x)beadecrea\sin gfunctiondef \in edon[a, b]$

int_(-2)^2 maxabsx, absx} dx` where [] denotes the greatest integer function) is equal to

A. (-2)

B. (-1)

C. 0

D. 1

Answer: A

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181. Choose the correct answer:

The hybridisation of the carbon atom (underlined) present in

`(PAT_CHE_0XI_B02_C03_E01_022_Q01.png" width="80%">

is

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182. Choose the correct answer:

The hybridisation of the carbon atom (underlined) present in

`(PAT_CHE_0XI_B02_C03_E01_022_Q01.png" width="80%">

is

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183. If $\int_0^{\frac{\pi}{2}} \sin\theta \log \sin\theta d\theta = \log\left(\frac{A}{198e}\right)$ then the last digit of A is equal to

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184. If $\int_0^1 \frac{dx}{(1+x)(2+x)\left(\sqrt{x(1-x)}\right)} = \frac{\pi A}{\sqrt{6}\left(\sqrt{3}+1\right)}$ then A is equal to

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185. If $-\int_0^{2\pi}[\sin x+\cos x]dx=A\pi$ and [x] denotes the greatest integer function then A is equal to

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186. The value of the integral $\sqrt{2}\int_0^{\pi}\sqrt{1-\cos 2x}dx$ is ?

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187. The value of the integral $\sqrt{2}\int_0^{\frac{\pi}{2}}f(\sin 2x)\sin x dx=A\left(\frac{\sqrt{2}}{9}\right)\int_0^{\frac{\pi}{4}}f(\cos 2x)\cos x dx$ then the value of A is

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188. Evaluate $\int_0^{\sqrt{3}} \left(\frac{1}{1+x^2}\right) \sin^{-1}\left(\frac{2x}{1+x^2}\right) dx$

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189. Evaluate :

$\int_0^{\pi/2} \cos^3 x \cdot \sin x dx$

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190. Evaluate $\int_0^{\frac{\pi}{4}} \left(e^{\sec x} \frac{\sin\left(x + \left(\frac{\pi}{4}\right)\right)}{\cos x(1 - \sin x)} dx \right.$

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191. If $|a| < 1$ show that $\int_0^{\pi} \frac{\log(1 + a\cos x)}{\cos x} dx = \pi \sin^{-1} a$

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192. If $U_n = \int_0^{\pi} \frac{1-\cos nx}{1-\cos x}$ dx where n is positive integer or zero, then show that $U_{n+2} + U_n = 2U_{n+1}$. Hence deduce that $\int_0^{\pi} \frac{\sin^2 n\theta}{\sin^2 \theta} = \frac{1}{2}(n\pi)$

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193. Prove that $\int_0^x e^{xt} e^{-t^2} dt = e^{\frac{x^2}{4}} \int_0^x e^{-\frac{t^2}{4}} dt$

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194. Find a function $g: R \to R$ continous in $[0, \infty]$ satisfying g(0) =1 and $\frac{1}{2}\int_0^x g^2(t)dt = \frac{1}{x}\left(\int_0^x g(t)dt\right)^2$)

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195. Evaluate $\lim_{n\to\infty} \frac{1}{n}\sum_{r=1}^{4n} \frac{r}{\sqrt{n^2+r^2}}$

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196. If $I_n = \int_0^1 x^n \tan^{-1} x\,dx$ then prove that $(n+1)I_n + (n-1)I_{n-2} = \left(\frac{\pi}{2}\right) - \left(\frac{1}{n}\right)$

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197. If $f(x) = x + \int_0^1 \left(xy^2 + x^2 y\right)$ dy find f(x)

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198. The total number of distinct $x \in [0,1]$ for which $\int_0^x \frac{t^2}{1+t^4}dt = 2x - 1$ is

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199. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{x^2 \cos x}{1+e^x} dx$ is equal to

A. $\left(\frac{\pi^2}{4}\right) - 2$

B. $\left(\left(\frac{\pi^2}{4}\right) + 2\right.$

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

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

Answer:

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200. $\lim_{n \to \infty} \frac{(n+1)(n+2)....3n}{n^{2n}}\Bigg)^{\frac{1}{n}}$ is equal to

A. 3 log3-2

B. $\frac{18}{e^4}$

C. $\frac{27}{e^2}$

D. $\frac{9}{e^2}$

Answer:

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201. $\int_0^5 \left(\left(\frac{1}{x}\right) - 1\right) dx$= ?

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202. The value of $\lim_{n \to \infty} \left\{ \frac{\sqrt{n+1} + \sqrt{n+2} + \ldots\ldots + \sqrt{2n}}{n^{\frac{3}{2}}} \right.$ is

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

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

C. $\frac{2}{3}\left(\sqrt{2}+1\right)$

D. $\frac{2}{3}\left(2\sqrt{2}+1\right)$

Answer:

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203. if [x] denotes the greatest integer less than or equal to x then integral $\int_0^2 x^2[x]dx$ equals

A. 44319

B. 44380

C. 44411

D. 44289

Answer:

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204. $(\phi)_t = \{1, f \text{ or } 0 \leq \ < 1$

0 otherwise then $\int_{-3000}^{3000} \left(\sum_{r=2014}^{2016} \phi(t - r')\phi(t - 2016) \right) dt =$

A. a real number

B. 1

C. 0

D. does not exist

Answer:

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205. Let $f: R \to R$ be a function defined by $f(x) = \begin{cases} [x] & x \leq 2 \\ 0 & x > 2 \end{cases}$

where [x] is the greatest integer less than or equal to x. If $I = \int_{-1}^{2} \frac{xf(x^2)}{2 + f(x+1)} dx$, then the value of (4I-1) is

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206. If $\alpha = \int_{0}^{1} \left(e^{9x + 3\tan^{-1} x}\right)\left(\frac{12 + 9x^2}{1 + x^2}\right) dx$

where $\tan^{-1} x$ takes only principal value, then the value of $\left(\log_e |1 + \alpha| - \frac{3\pi}{4}\right)$ is

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207. Let $f: R \to R$ be a continuous odd function, which vanishes exactly at one point and $f(1) = \frac{1}{2}$. Suppose that $F(x) = \int_{-1}^{x} f(t)dt$ for all $x \in [-1, 2]$ and $G(x) = \int_{-1}^{x} t|f(f(t))|dt$ for all $x \in [-1, 2]$. If $\lim_{x \to 1} \frac{F(x)}{G(x)} = \frac{1}{14}$, Then the value of $f\left(\frac{1}{2}\right)$ is

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208. Let $f(x) = 7\tan^8 x + 7\tan^6 x - 3\tan^4 x - 3\tan^2 x$ for all $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$. The correct expression(s) is (are)

A. $\int_0^{\pi/4} xf(x).\,dx = \frac{1}{12}$

B. $\int_0^{\pi/4} f(x)dx = 0$

C. $\int_0^{\pi/4} xf(x).\,dx = \frac{1}{6}$

D. $\int_0^{\pi/4} f(x).\,dx = 1$

Answer:

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209. If f(x) + 2f(1 - x) $= x^2 + 2, \forall x \in R$, then f(x) is

A. m=13, M=24

B. m=1/4, M=1/2

C. m=-11, M=0

D. m=1, M=12

Answer:

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210. The option(s) with the values of a and L that satisfy the following equation is (are)

$$\frac{\int_0^{4\pi} e^t\left(\sin^6 at+\cos^4 at\right)dt}{\int_0^{\pi} e^t\left(\sin^6 at+\cos^4 at\right)dt}=L$$

A. $a=2, L=\frac{e^{4\pi}-1}{e^{\pi}-1}$

B. $a=2, L=\frac{e^{4\pi}+1}{e^{\pi}+1}$

C. $a=4, L=\frac{e^{4\pi}-1}{e^{\pi}-1}$

D. $a=4, L=\frac{e^{4\pi}+1}{e^{\pi}+1}$

Answer:

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211. Let $F: R \to R$ be a thrice differentiable function. Suppose that F(1)=0, F(3)=-4 and $F'(x) < 0$ for all $x \in (1/2, 3)$. Let f(x)=xF(x) for all $x \in R$.

If $\int_1^3 x^2 F'(x)dx = -12$ and $\int_1^3 x^3 F''(x)dx = 40$, then the correct expression(s) is (are)

A. 9f'(3) +f'(1) -32=0

B. $\int_1^3 f(x)dx = 12$

C. 9f'(3)-f'(1) +32=0

D. $\int_1^3 f(x)dx = -12$

Answer:

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212. The integral $\int_2^4 \frac{\log x^2}{\left(\log x^2\right) + \log(36 - 12x + x^2)} dx$ is equal to:

A. 4

B. 1

C. 6

D. 2

Answer:

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213. Let

$x_n = \left(1 - \frac{1}{3}\right)^2 \left(1 - \frac{1}{6}\right)^2 \left(1 - \frac{1}{10}\right)^2 \ldots\ldots \left(1 - \frac{1}{\frac{n(n+1)}{2}}\right)^2, n \geq 2$

Then the value of $\lim_{n \to \infty} x_n$ is

A. 10

B. 12

C. 8

D. 16

Answer:

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214. $\lim_{n \to \infty} \frac{\sqrt{1} + \sqrt{2} + \ldots\ldots + \sqrt{n-1}}{n\sqrt{n}}$ = ?

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215. Let f : R $\to$ R be a continuous function which satisfies $f(x) = \int_0^x f(t)dt$. Then the value of $f(\log_e 5)$ is

A. 0

B. 2

C. 5

D. 3

Answer: A

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216. Let

$$x_n = \left(1 - \frac{1}{3}\right)^2 \left(1 - \frac{1}{6}\right)^2 \left(1 - \frac{1}{10}\right)^2 \ldots\ldots \left(1 - \frac{1}{\frac{n(n+1)}{2}}\right)^2, n \geq 2$$

Then the value of $\lim_{n \to \infty} x_n$ is

A. 1/5

B. 1/9

C. 1/81

D. 0

Answer: B

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217. Let f(x) denote the fractional part of a real number x. Then the value of $\int_0^{\sqrt{3}} f\left(x^2\right) dx$ is

A. $2\sqrt{3} - \sqrt{2} - 1$

B. 0

C. $\sqrt{2} - \sqrt{3} + 1$

D. $\sqrt{3} - \sqrt{2} + 1$

Answer: C

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218. Let f : $(0, \infty) \to R$ be given by

$$f(x) = \int_{\frac{1}{x}}^{x} e^{-\left(t+\frac{1}{t}\right)} \frac{dt}{t}$$

then

A. f(x) is monotonically increasing on $(1, \infty)$

B. f(x) is monotonically decreasing on (1,0)

C. f(x) + f(1/x) = 0, for all $x \in (0, \infty)$

D. $f\left(2^{\square}\right)$ is an odd function of x on R

Answer: A::C::D

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219. Let f : [a , b] $\to [1, \infty]$ be a continuous function and let g : R $\to$ R be defined as

$$g(x) = \begin{cases} 0 & \text{if } x < a \\ \int_a^x f(t)dt & \text{if } a \leq x \leq b \\ \int_a^b f(t)dt & \text{if } x > b \end{cases}$$

Then

A. g(x) is continuous but not differentiable at a

B. g(x) is differentiable on R

C. g(x) is continuous but not differentiable at b

D. g(x) is continuous and differentiable at either a or b but not both

Answer: A::C

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220. The value of $\int_0^1 4x^3 \left\{ \frac{d^2}{dx^2}\left(1-x^2\right)^5 \right\} dx$ is

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221. The following integral $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} (2\cos ecx)^{17} dx$ is equal to

A. $\int_0^{\log\left(1+\sqrt{2}\right)} 2\left(e^u + e^{-u}\right) du$

B. $\int_0^{\log\left(1+\sqrt{2}\right)} \left(e^u + e^{-u}\right) du$

C. $\int_0^{\log\left(1+\sqrt{2}\right)} \left(e^u - e^{-u}\right) du$

D. $\int_0^{\log\left(1+\sqrt{2}\right)} \left(e^u - e^{-u}\right) du$

Answer: A

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222. Let f : [0,2] $\rightarrow$ R be a function which is continuous on [0 , 2] and is differentiable on (0 , 2) with f(0) = 1. Let

F(x) = $\int_0^{x^2} f\left(\sqrt{t}\right) dt$

for $x \in [0, 2]$. If F'(x) = f'(x) for all $x \in (0, 2)$, then F(2) equals

A. $e^2 - 1$

B. $e^4 - 1$

C. e - 1

D. e^4

Answer: B

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223. Given that for each $a \in (0, 1)$,

$$\lim_{h \to 0} \int_h^{1-h} t^{-a}(1-t)^a dt$$

exists. Let this limit be g(a). In addition , it is given that the function g(a) is differentiable on (0 , 1).

The value of g(1/2) is

A. π

B. 2π

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

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

Answer: A

Watch Video Solution

224. Given that for each $a \in (0, 1)$,

$$\lim_{h \to 0} \int_{h}^{1-h} t^{-a}(1-t)^{a} dt$$

exists. Let this limit be g(a). In addition , it is given that the function g(a) is differentiable on (0 , 1).

The value of g'(1/2) is

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

B. π

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

D. 0

Answer: D

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225. Match List - I with List - II

8. Match List - I with List - II

List - I	List - II
(P) The number of polynomials f(x) with non-negative integer coefficients of degree ≤ 2, satisfying $f(0) = 0$ and $\int_0^1 f(x)dx = 1$, is	(i) 8
(Q) $\int_{-2}^{2} \frac{3x^2}{(1+e^x)} dx$ equals	(ii) 2
(R) $\frac{\left(\int_{-\frac{1}{2}}^{\frac{1}{2}} \cos 2x \log\left(\frac{1+x}{1-x}\right)dx\right)}{\left(\int_{0}^{\frac{1}{2}} \cos 2x \log\left(\frac{1+x}{1-x}\right)dx\right)}$ equals	(iii) 0

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226. The integral $\int_0^{\pi} \sqrt{1+4\sin^2\left(\frac{x}{2}\right)-4\sin\left(\frac{x}{2}\right)}dx$ equals :

A. $4\sqrt{3}-4$

B. $4\sqrt{3}-4-\frac{\pi}{3}$

C. $\pi-4$

D. $\frac{2\pi}{3}-4-4\sqrt{3}$

Answer: B

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227. If $I=\int_0^2 (e^x)^4(x-\alpha)dx=0$, then α lies in the interval

A. (0,2)

B. $(-1,0)$

C. (2,3)

D. (-2,-1)

Answer: A

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228. Suppose $M = \int_0^{\frac{\pi}{2}} \frac{\cos x}{x+2} dx, N = \int_0^{\frac{\pi}{4}} \sin x \frac{\cos x}{(x+1)^2} dx$.

Then the value of (M - N) equals

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

B. $\frac{2}{\pi - 4}$

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

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

Answer: D

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229. Let f(x) = $\max\{x+|x|, x-[x]\}$, where [x] de notes the greatest integer $\leq$ x. Then the value of $\int_{-3}^{3} f(x)dx$

A. 0

B. 51/2

C. 21/2

D. 1

Answer: C

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230. Let $f(x) = \begin{cases} \int_0^x |1-t|dt & x > 1 \\ x - \frac{1}{2} & x \leq 1 \end{cases}$

Then

A. f(x) is continuous at x = 1

B. f(x) is not continuous at x = 1

C. f(x) is differentiable x = 1

D. f(x) is not differentiable x = 1

Answer: A::D

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231. Statement - 1 : The value of the integral

$\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1+\sqrt{\tan x}}$ is equal to $\frac{\pi}{6}$

Statement-2 : $\int_a^b f(x) = \int_a^b f(a+b-x)dx$

A. Statement - 1 is true, Statement - 2 is true .

B. Statement - 1 is true, Statement - 2 is false .

C. Statement - 1 is false, Statement - 2 is true .

D. Statement - 1 is true, Statement - 2 is true , Statement - 2 is a correct explanation for statement - 1.

Answer: 3

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232. The value of the integral

$$\int_{-1}^{+} 1\left\{\frac{x^{2013}}{e^{|x|}\left(x^2+\cos x\right)}+\frac{1}{e^{|x|}}\right\}dx$$

is equal to

A. 0

B. $1-e^{-1}$

C. $2e^{-1}$

D. $2\left(1-e^{-1}\right)$

Answer: 4

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233. The value of $I = \int_0^{\frac{\pi}{4}} \left(\tan^{n+1} x\right) dx + \frac{1}{2} \int_0^{\frac{\pi}{2}} \tan^{n-1}\left(\frac{x}{2}\right) dx$ is equal to

A. 1/n

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

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

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

Answer: 1

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234. The value of the integral

$\int_1^2 e^x \left(\log_e x + \frac{x+1}{x}\right) dx$ is

A. $e^2(1+\log_e 2)$

B. e^2-e

C. $e^2(1+\log_e 2)-e$

D. $e^2-e(1+\log_e 2)$

Answer: 3

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235. Let [a] denote the greatest integer which is less than or equal to a. Then the value of the integral

$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}[\sin x\cos x]dx$ is

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

B. π

C. $-\pi$

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

Answer: 4

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236. The value of the integral $\int \frac{\sin x - x\cos x}{x(x+\sin x)} dx$ is equal to

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237. Let F(x) = $\int_0^x \frac{\cos t}{1+t^2} dt$, $0 \leq x \leq 2\pi$. Then

A. F is Increasing in $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$ and decreasing in $\left(0, \frac{\pi}{2}\right)$ and $\left(\frac{3\pi}{2}, 2\pi\right)$

B. F is increasing in $(0, \pi)$ and decreasing in $(\pi, 2\pi)$

C. F is increasing in $(\pi, 2\pi)$ and decreasing in $(0, \pi)$

D. F is Increasing in $\left(0, \frac{\pi}{2}\right)$ and $\left(\frac{3\pi}{2}, 2\pi\right)$ and decreasing in $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$

Answer: 4

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238. The value of the integral $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left(x^2 + In\frac{\pi + x}{\pi - x}\right) \cos x dx$ is

A. 0

B. $\frac{\pi^2}{2} - 4$

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

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

Answer: B

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239. If g(x)=$\int_0^x \cos^4 t dt$, then g(x + pi) equals

A. $\frac{g(x)}{g(\pi)}$

B. $g(x) + g(\pi)$

C. $g(x) - g(\pi)$

D. $g(x)g(\pi)$

Answer: B::C

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240. The value of the integral $\int_{\frac{\pi}{6}}^{\frac{\pi}{2}} \left(\frac{1 + \sin 2x + \cos 2x}{\sin x + \cos x}\right) dx$ is

A. 16

B. 8

C. 4

D. 1

Answer: D

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241. The value of the integral $\int_0^{\frac{\pi}{2}} \frac{1}{1+(\tan x)^{101}} dx$ is equal to

A. 1

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

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

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

Answer: D

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242. The value of the integral $\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{3 + \sin 2x} dx$ is equal to

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243. The value of the integral $\int_{-2}^{2} (1 + 2\sin x) e^{|x|}$ dx is equal to

A. 0

B. $e^2 - 1$

C. $2\left(e^2 - 1\right)$

D. 1

Answer: C

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244. The value of the integral $\int_1^5 [|x - 3| + |1 - x|] dx$ is equal to

A. 4

B. 8

C. 12

D. 16

Answer: C

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245. Let [x] denote the greatest integer less than or equal to x, then the value of the integral $\int_{-1}^{1}(|x|-2[x])dx$ is equal to

A. 3

B. 2

C. -2

D. -3

Answer: A

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246. The value of $\lim_{n \to \infty} t \frac{(nl)^{\frac{1}{n}}}{n}$ is

A. 1

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

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

D. 1/e

Answer: D

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