



MATHS

BOOKS - DEEPTI MATHS (TELUGU ENGLISH)

DEFINITE INTEGRATION

SOLVED EXAMPLES

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

A. $\pi/2$

B. π

C. 2π

D. $3\pi/2$



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

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

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

C. $\frac{7\pi}{4}$

D. $\frac{5\pi}{6}$



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$$3. \int_0^1 x(1-x)^{10} dx =$$

A. $1/130$

B. $1/132$

C. $1/321$

D. $1/130$



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4. $\int_0^3 [x] dx =$

A. 1

B. 2

C. 3

D. 4



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5. $\int_0^{\pi/2} \sin^7 x dx$

A. $14/35$

B. $8/35$

C. 16/35

D. 26/35

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6.
$$\int_0^{2\pi} \frac{x \sin^6 x}{\sin^6 x + \cos^6 x} dx =$$

A. π

B. π^2

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

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

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7.
$$\int_0^{\pi/2} \frac{5 + 4 \cos x}{(4 + 5 \cos x)^2} dx =$$

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

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

C. $\frac{1}{20}$

D. 0



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8. $\int_0^3 (|x| + |x - 1| + |x - 2|) dx =$

A. $9/2$

B. 7

C. 5

D. $19/2$



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9. $\lim_{n \rightarrow \infty} \left\{ \frac{1}{n} + \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{4n} \right\} =$

A. $\pi/4$

B. $\log 4$

C. $\log 2$

D. $\log 3$



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

A. 0

B. $-1/2$

C. $1/2$

D. none



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11. The area bounded between the curves $y = x^2$ and $y = x^3$ is

A. $1/6$

B. $1/12$

C. $1/4$

D. $1/3$



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12. The area of the part of the circle $x^2 + y^2 = 8a^2$ and the parabola $y^2 = 2ax$ through which positive X-axis passes is

A. $4a^2 \left(\frac{3\pi + 2}{3} \right)$

B. $2a^2 \left(\frac{3\pi - 2}{3} \right)$

C. $\frac{a^2(3\pi - 2)}{3}$

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

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13. Area bounded by the curve $x^{2/3} + y^{2/3} = a^{2/3}$ and \vec{OX}, \vec{OY} is

A. $\frac{3\pi a^2}{16}$

B. $\frac{3\pi a^2}{8}$

C. $\frac{\pi a^2}{32}$

D. $\frac{\pi a^2}{16}$

Answer: b

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14. The area bounded by the curve $y = (x - 1)(x - 2)(x - 3)$ and X-axis lying between ordinates $x=0$ and $x=3$ is

A. $\frac{9}{4}$

B. $\frac{11}{4}$

C. $\frac{11}{2}$

D. 5



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EXERCISE 1A

1. $\int_0^2 (3x^2 + 4x + 3) dx =$

A. 20

B. 22

C. 25

D. 30

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2. $\int_0^{\pi/4} \sec^2 x dx =$

A. $e - 1$

B. 1

C. e

D. 2

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3. $\int_0^{\pi/2} \sqrt{1 + \sin 2x} dx$

A. 1

B. -2

C. $\sqrt{2}$

D. 2



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4. 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



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

A. $\log 2$

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

C. 2

D. $\log 3$



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

A. $\log 2$

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

C. 2

D. none



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$$7. \int_0^{\pi/2} \frac{\cos x}{1 + \sin x} dx =$$

A. $\log 2$

B. $1/2 \log 2$

C. 2

D. none



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$$8. \int_{1/2}^1 \frac{1}{\sqrt{1-x^2}} dx =$$

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi / 4a$



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9. $\int_{\sqrt{2}/3}^{\sqrt{3}/3} \frac{dx}{\sqrt{4-9x^2}} =$

A. $\pi / 6$

B. $\pi / 12$

C. $\pi / 24$

D. $\pi / 36$



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

A. $\pi / 2$

B. $\pi / 3$

C. $\pi / 4$

D. $\pi / 4a$

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

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

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

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

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

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12. $\int_0^1 \sqrt{1-x^2} dx$

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

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

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

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

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

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

B. πa^2

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

D. $\frac{\pi a^2}{4}$



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14. $\int_{\pi/6}^{5\pi/6} \sqrt{4 - 4\sin^2 t} \, dt =$

A. 0

B. 2

C. 1

D. none



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15. The value of the integral $\int_0^3 \frac{dx}{\sqrt{x+1} + \sqrt{5x+1}}$ is

A. $\frac{11}{15}$

B. $\frac{14}{15}$

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

D. $1 + \frac{1}{2} \log\left(\frac{3}{5}\right)$

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16. $\int_0^1 \frac{4x^3}{\sqrt{1-x^8}} dx =$

A. $\pi/3$

B. $\pi/2$

C. $\pi/4$

D. 2π

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17. $\int_0^1 \frac{x^3}{1+x^8} dx =$

A. $\pi/16$

B. $\pi/4$

C. $\pi/2$

D. $\pi/8$



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18. $\int_0^{\pi/4} (\tan^4 x + \tan^3 x) dx =$

A. 1

B. $1/2$

C. $1/3$

D. $1/4$



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19. $\int_0^{\pi/4} \frac{e^{\tan x}}{\cos^2 x} dx =$

A. $e-1$

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

C. $e^{-1} + 1$

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



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20. $\int_{1/\sqrt{3}}^1 \frac{(\tan^{-1} x)^3}{1+x^2} dx =$

A. $\frac{\pi^4}{64}$

B. $\frac{\pi^4}{256}$

C. $\frac{\pi^4}{1024}$

D. $\frac{65\pi^4}{64 \times 1296}$



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

A. π

B. 2π

C. 4π

D. none



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22. $\int_1^e \frac{(\log x)^3}{x} dx =$

A. $\frac{e^4}{4}$

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

C. $\frac{1}{4}(e^4 - 1)$

D. none



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23. $\int_{1/\pi}^{2/\pi} \frac{\sin(1/x)}{x^2} dx =$

A. $\pi/2$

B. π

C. 1

D. none



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24. $\int_{1/\pi}^{2/\pi} \frac{\cos(1/x)}{x^2} dx =$

A. 1

B. -1

C. 2

D. 0

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25.
$$\int_0^{\infty} \frac{dx}{\left(x + \sqrt{x^2 + 1}\right)^3} =$$

A. $3/8$

B. $1/8$

C. $-3/8$

D. $-1/8$

 [Watch Video Solution](#)

26. $\int_0^x (a^{-x} - b^{-x}) dx =$

A. $\frac{1}{\log a} - \frac{1}{\log b}$

B. $\log a - \log b$

C. $\log a + \log b$

D. $\frac{1}{\log a} + \frac{1}{\log b}$



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27. $\int_0^{\infty} e^{-x \log 2} dx =$

A. 0

B. ∞

C. 1

D. $1/\log 2$

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28. $\int_2^3 \frac{2-x}{\sqrt{5x-6-x^2}} dx =$

A. $\pi/2$

B. $-\pi/2$

C. $-\pi/3$

D. $-\pi$

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

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

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

C. $\pi - 1$

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



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

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

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

C. $\frac{a}{3}(\pi + 2)$

D. $\frac{a}{3}(\pi + 3)$



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

A. $\pi/2$

B. $\pi/4$

C. $\pi/6$

D. $\pi/8$

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32. $\int_1^2 \sqrt{(x-1)(2-x)} dx =$

A. $\pi/8$

B. $\pi/4$

C. $1/8$

D. none

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33. The value of $\int_{-1}^1 \left(\sqrt{1+x+x^2} - \sqrt{1-x+x^2} \right) dx$ is

A. 0

B. 1

C. -1

D. none

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34. $\int_{-1}^1 \left\{ \left(\frac{x+2}{x-2} \right)^2 + \left(\frac{x-2}{x+2} \right)^2 - 2 \right\}^{1/2} dx =$

A. $8 \log \frac{4}{3}$

B. $8 \log \frac{3}{4}$

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

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



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35. $\int_0^1 (1 + e^{-x}) dx =$

A. -1

B. 2

C. $1 + e^{-1}$

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



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

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

B. $\tan^{-1} e + \pi/4$

C. $\tan^{-1} e - \pi/2$

D. none



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$$37. \int_0^{\log 5} \frac{e^x \sqrt{e^x - 1}}{e^x + 3} dx =$$

A. $3 + 2\pi$

B. $4 - \pi$

C. $2 + \pi$

D. none



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$$38. \int_0^{\pi/2} e^{\sin^2 x} \sin 2x dx =$$

A. e

B. $e+1$

C. $e-1$

D. $2e + 1$

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

A. 0

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

C. 1

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

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

A. 1

B. 2

C. -1

D. -2



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41. $\int_{\pi/4}^{3\pi/4} \frac{1}{1 + \cos x} dx$

A. 2

B. -2

C. 1/2

D. -1/2



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42. $\int_0^3 x\sqrt{1+x} dx =$

A. $9/2$

B. $27/4$

C. $116/15$

D. $112/15$



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

A. $\log 2$

B. $2 \log 2$

C. $3 \log 3$

D. $1/2 \log 2$



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

A. $2 \left[\frac{5}{6} + \log 2 \right]$

B. $2 \left[\frac{5}{6} - \log 2 \right]$

C. $\left[\frac{5}{6} - \log 2 \right]$

D. none



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45. $\int_{\pi^2/16}^{\pi^2/4} \frac{\sin \sqrt{x}}{\sqrt{x}} dx =$

A. $\sqrt{2}$

B. $1/\sqrt{2}$

C. $2\sqrt{2}$

D. $\pi/2$

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46. $\int_0^1 \frac{x}{(1-x)^{5/4}} dx =$

A. $16/3$

B. $3/16$

C. $-3/16$

D. $-16/3$

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

A. 3

B. 0

C. 6

D. 4



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48. $\int_0^\pi \sin^3 x \cos^4 x dx =$

A. $4/35$

B. $4/30$

C. $4/25$

D. $4/33$



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

A. $8/693$

B. $5/693$

C. $4/693$

D. $10/693$



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50. $\int_0^{\pi} -\frac{\sin^3 x}{1 + \cos^3 x} dx$

A. $\pi - 1$

B. $\pi + 2$

C. $\pi - 2$

D. $2\pi - 2$



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

A. 10

B. 5

C. $1/10$

D. $1/5$



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52. $\int_{\pi/6}^{\pi/4} \frac{dx}{\sin 2x} =$

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

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

C. $\log 3$

D. $2 \log 3$



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

A. $\pi / 3$

B. $\pi / 4$

C. $\pi / 2$

D. 2π



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

A. ∞

B. $\pi/4$

C. $\pi/2$

D. none



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55. If $\int_0^k \frac{\cos x}{1 + \sin^2 x} dx = \frac{\pi}{4}$ then $k =$

A. 1

B. $\pi/4$

C. $\pi/2$

D. none



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

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

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

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

D. none



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57. $\int_{-1}^1 xe^x dx =$

A. $2/e$

B. $e^2/2$

C. e

D. none



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58. $\int_0^1 e^x (x^x + 1)^3 dx =$

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

B. $\frac{(e + 1)^4}{4} - 4$

C. $\frac{(e + 1)^4 + 16}{4}$

D. none



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59. $\int_1^2 \log x dx =$

A. $2 \log 2 - 1$

B. $\log 2 - 1$

C. $2\log 2 + 1$

D. $2\log 2 - 2$

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

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

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

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

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

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61. $\int_{-\pi}^{\pi} x^3 \cos x dx =$

A. 0

B. 1

C. 2

D. none



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62. $\int_{-\pi}^{\pi} x^4 \sin x dx =$

A. 1

B. 0

C. 2

D. none



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$$63. \int_0^{\pi/2} \left(2 \tan \frac{x}{2} + x \sec^2 \frac{x}{2} \right) dx =$$

A. π

B. $\pi/2$

C. $2\pi/3$

D. $\pi/6$



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$$64. \int_{1/2}^1 \sin^{-1} \sqrt{x} dx =$$

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

B. $\frac{\pi - 1}{8}$

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

D. $\frac{\pi - 2}{8}$



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

A. $\pi/8$

B. $-\pi/8$

C. $\pi/4$

D. $\pi/2$



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66. $\int_0^1 \tan^{-1} x dx =$

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

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

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

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

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67. Evaluate the integral

$$\int_0^1 x \tan^{-1} x dx$$

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

B. $\frac{\pi}{18} - \frac{1}{2}$

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

D. $\frac{\pi}{8} + \frac{1}{2}$

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$$68. 2 \int_0^1 \frac{\tan^{-1} x}{x} dx =$$

A. $\frac{\pi^2}{6} - \frac{\pi}{3} + \frac{1}{2} \log 2$

B. $\frac{\pi^2}{16} + \frac{\pi}{4} + \frac{1}{2} \log 2$

C. $\frac{\pi^2}{16} - \frac{\pi}{4} + \frac{1}{2} \log 2$

D. none

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$$69. \int_0^1 \frac{\tan^{-1} x}{x} dx =$$

A. $\frac{1}{2} \int_0^{\pi/4} \frac{x}{\sin x} dx$

B. $\int_0^{\pi/4} \frac{x}{\sin x} dx$

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

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



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

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

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

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

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



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71. Evaluate the integral

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

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

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

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

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

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72. $\int_0^{1/\sqrt{2}} \frac{\sin^{-1}}{(1-x^2)^{3/2}} dx =$

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

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

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

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

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73. $\int_0^1 \tan^{-1} \left[\frac{2x-1}{1+x-x^2} \right] dx =$

A. 0

B. $1/2$

C. 1

D. ∞



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74. $\int_0^{\pi^2/4} \sin \sqrt{x} dx =$

A. 1

B. 2

C. $\pi + 2$

D. $(\pi/2) - 1$



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75. $\int_0^{\pi^2/4} \cos \sqrt{x} dx =$

A. 2

B. $\pi - 2$

C. $\pi + 2$

D. $(\pi/2) - 1$



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

A. 0

B. 1

C. -1

D. 2



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$$77. \int_0^1 \frac{xe^x}{(x+1)^2} dx =$$

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

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

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

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



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$$78. \int_0^\pi e^x \sin x dx =$$

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

B. $e^\pi + 1$

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

D. $\frac{1}{2}(e^\pi + 1)$



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

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

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

C. $\sqrt{2}$

D. 1



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

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

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

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

D. π



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81. $\int_0^{\pi/4} \frac{\sin x + \cos x}{7 + 9 \sin 2x} dx =$

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

B. $\frac{\log 3}{36}$

C. $\frac{\log 7}{12}$

D. $\frac{\log 7}{24}$



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82. 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. none



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83. If $I = \int_0^1 \sqrt{1+x^3} dx$ then

A. $I > 1$

B. $I \neq \frac{\sqrt{5}}{2}$

C. $I > \frac{\sqrt{7}}{2}$

D. none



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84. If $I = \int_0^1 \frac{dx}{\sqrt{1+x^4}}$, then

A. $I > 0.78$

B. $I < 0.78$

C. $I > 1$

D. none



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85. Evaluate the integral

$$\int_0^{\pi/2} \frac{dx}{4 + 5 \cos x}$$

A. $\frac{1}{5} \log 2$

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

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

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

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

A. $\frac{1}{\sqrt{3}} \log \left| \frac{5 + \sqrt{5}}{5 - \sqrt{5}} \right|$

B. $\frac{1}{\sqrt{5}} \log \left| \frac{5 - \sqrt{5}}{5 + \sqrt{5}} \right|$

C. $\frac{1}{\sqrt{5}} \log \left| \frac{5 + \sqrt{5}}{5 - \sqrt{5}} \right|$

D. none

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

A. $\pi/3$

B. $\pi/4$

C. $\pi/6$

D. $\pi/2$

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

A. $\frac{\pi}{\sqrt{5}}$

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

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

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

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

A. $\pi/2$

B. $\pi/10$

C. $\pi/5$

D. $\pi/2$



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

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

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

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

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



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

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

B. $\log 2$

C. $\log 3$

D. $\frac{1}{4} \log 3$



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EXERCISE 1B

1. 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. $(1/3)(4\sqrt{2} + 1)$

B. $(1/3)(4\sqrt{2} - 1)$

C. $(1/3)(2\sqrt{2} - 1)$

D. $(1/2)(3\sqrt{2} - 1)$

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2. 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

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3. If $f(x)$ is an even function then $\int_{-\pi}^{\pi} f(x)\sin nx dx =$

A. 0

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

C. $4 \int_0^{\pi/2} f(x)\sin nx dx$

D. none



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4. $I = \int_0^1 e^{x^2} dx$ satisfies the inequality

A. $0 < l < 1$

B. $-1 \leq l \leq 1$

C. $1 \leq I \leq e$

D. none



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5. $\int_{-\pi/2}^{\pi/2} \sin x \cdot \cosh x dx =$

A. 0

B. $\pi/4$

C. $(e^\pi)/4$

D. none



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

A. 0

B. $\pi/4$

C. e^π

D. none



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$$7. \int_{-\pi/2}^{\pi/2} \sin x \operatorname{sech} x dx =$$

A. 0

B. 1

C. $\pi/4$

D. none



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$$8. \int_{-1}^1 \frac{\cosh x}{1 + e^x} dx =$$

A. 0

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

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

D. none



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

A. 0

B. 1

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

D. none



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

A. 1

B. 0

C. π

D. $\pi/4$



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11. Evaluate the definite integrals .

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

A. 0

B. -2

C. 2

D. 1



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

A. $a\pi$

B. $\pi/2$

C. π/a

D. 2π



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13. $a > 0, \int_{-\pi}^{\pi} \frac{\sin^2 x}{1 + a^x} dx =$

A. $\pi/2$

B. π

C. $a\pi/2$

D. $a\pi$

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

A. any values of a and b

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

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

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

Answer: a

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15. If $\int_0^x f(t)dt = x + \int_x^1 tf(t)dt$, then the value of $f(1)$ is

A. $1/2$

B. 0

C. 1

D. $-1/2$

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

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

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

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

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

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

A. $-\sqrt{2}$

B. π

C. $\sqrt{3}/2$

D. $2\sqrt{2}$



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18. $\int_{\log 2}^t \frac{dx}{\sqrt{e^x - 1}} = \frac{\pi}{6}$, then t=

A. 4

B. $\log 8$

C. $\log 4$

D. none



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

A. $\pi/4$

B. $\pi/2$

C. $\pi/3$

D. $\pi/8$



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20.
$$\int_0^{\pi/2} \frac{\cos^{3/2} x}{\cos^{3/2} x + \sin^{3/2} x} dx =$$

A. $\pi/3$

B. $\pi/2$

C. $\pi/4$

D. $\pi/8$

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

A. $\pi/6$

B. $\pi/12$

C. $\pi/2$

D. $\pi/3$

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$$22. \int_0^{\pi/2} \frac{\sec x}{\sec x + \cos ecx} dx =$$

A. $\pi/3$

B. $\pi/2$

C. $\pi/4$

D. $\pi/8$



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$$23. \int_0^{\pi/2} \frac{\cot x}{\tan x + \cot x} dx =$$

A. $\pi/4$

B. $\pi/2$

C. $\pi/3$

D. $\pi/8$



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24.
$$\int_0^{\pi/2} \frac{\sqrt{\cot x}}{\sqrt{\tan x} + \sqrt{\cot x}} dx =$$

A. π

B. $\pi/2$

C. $\pi/3$

D. $\pi/4$



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25.
$$\int_0^{\pi/2} \frac{1}{1 + \sqrt{\cot x}} dx =$$

A. 0

B. $\pi/2$

C. $\pi/4$

D. π



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

A. π

B. $\pi/2$

C. $\pi/4$

D. $3\pi/2$



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

A. 50π

B. 25π

C. 75π

D. 150π

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28.
$$\int_0^{\pi/2} \frac{5 \tan x - 3 \cot x}{\tan x + \cot x} dx =$$

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/8$

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29. $\int_0^{\pi/2} \frac{3 \sec x + 5 \operatorname{cosec} x}{\sec x + \operatorname{cosec} x} dx =$

A. π

B. 2π

C. 3π

D. $\pi/2$



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

A. 0

B. $\pi/2$

C. $\pi/3$

D. $\pi/4$



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

A. ∞

B. $\pi/4$

C. 0

D. none



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

A. 1

B. 0

C. 2

D. none



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33. Show that $\int_0^{\pi/2} \frac{x}{\sin x + \cos x} dx = \frac{\pi}{2\sqrt{2}} \log(\sqrt{2} + 1)$.

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

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

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

D. none



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34. Evaluate the integral

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

A. $\pi^2 / 2$

B. $\pi^2 / 3$

C. π^2

D. $\pi^2 / 4$



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

A. $\pi^2 / 4$

B. $\pi^2 / 3$

C. $\pi^2 / 2$

D. π^2



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$$36. \int_0^{\pi} \frac{x \tan x}{\sec x + \tan x} dx =$$

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

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

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

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



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$$37. \int_0^{\pi/4} \log(1 + \tan x) dx =$$

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

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

C. $\pi \log 2$

D. none

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

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

B. $\log 2$

C. $\pi \log 2$

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

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

A. 0

B. 1

C. $1/2$

D. 2



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

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. none



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

A. $\pi \log 2$

B. $-\pi \log 2$

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

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



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

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

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

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

D. none



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

A. $\pi \log 2$

B. $-\pi \log 2$

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

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



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

A. 2

B. 4

C. 1

D. 6



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

A. 0

B. 1

C. 2

D. -1



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

A. $\log 2$

B. $-\log 2$

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

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

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

A. $\pi \log 2$

B. $-\pi \log 2$

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

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

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

A. $\pi \log 2$

B. $-\pi \log 2$

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

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



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

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

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

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

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



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50. Evaluate the integral

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

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

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

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

D. 2π



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51. Evaluate the integral

$$\int_0^a x(a-x)^n dx$$

A. $\frac{a^{n+2}}{(n+1)(n+2)}$

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

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

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

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52. $\int_0^1 x^2(1-x)^5 dx =$

A. $\frac{1}{186}$

B. $\frac{1}{168}$

C. $\frac{1}{68}$

D. $\frac{1}{135}$

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53. $\int_0^5 x(5-x)^{10} dx =$

A. $\frac{(4)^{12}}{132}$

B. $\frac{(5)^{12}}{130}$

C. $\frac{(5)^{12}}{132}$

D. none



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

A. 0

B. 2

C. 3

D. 4



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$$55. \int_0^{\pi} \frac{x \cdot \sin 2x \cdot \sin[(\pi/2) \cos x]}{2x - \pi} dx =$$

A. $6/\pi^2$

B. $8/\pi^2$

C. $5/\pi^2$

D. $4/\pi^2$



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$$56. \int_0^{\pi} x f(\sin x) dx =$$

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

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

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

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



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57. If $\int_0^{\pi} x f(\sin x) dx = A \int_0^{\pi/2} (\sin x) dx$, then A is

A. 0

B. π^2

C. $\pi/4$

D. π



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58. If $f(x)$ is intergrable on $[0,a]$ then $\int_0^a \frac{f(x)}{f(x) + f(a-x)} dx =$

A. 0

B. 1

C. a

D. a/2



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59. $\int_a^b \frac{f(x)}{f(x) + f(a + b - x)} dx =$

A. a-b

B. b-a

C. $\frac{b - a}{2}$

D. $\frac{a - b}{2}$



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

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

B. $\frac{a - b}{2} \int_a^b f(x) dx =$

C. $\frac{a - b}{2} \int_a^b f(a + b - x) dx$

D. $\frac{a + b}{2} \int_a^b f(b - x) dx$



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61. $\int_2^3 \frac{\sqrt{x}}{\sqrt{5-x} + \sqrt{x}} dx$

A. $1/2$

B. $3/2$

C. $5/2$

D. 0



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

A. 2

B. 1

C. $1/2$

D. $3/2$



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63. $\int_{-a}^b \frac{\sqrt[3]{x+a}}{\sqrt[3]{x+a} + \sqrt[3]{b-x}} dx =$

A. $a-b$

B. $4a+b$

C. $(a+b)/2$

D. b-a



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64.

If

$$f(x) = \frac{e^x}{1 + e^x}, I_1 = \int_{f(-a)}^{f(a)} xg\{x(1-x)\}dx \text{ and } I_2 = \int_{f(-a)}^{f(a)} g\{x(1-x)\}dx$$

then the value of $\frac{I_2}{I_1}$ is

A. 2

B. 1

C. -1

D. -3



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65. Let $I = \int_0^1 \frac{\sin x}{\sqrt{x}} dx$ and $J = \int_0^1 \frac{\cos x}{\sqrt{x}} dx$. Then which one of the following is true?

A. $I < \frac{2}{3}$ and $J < 2$

B. $I < \frac{2}{3}$ and $2 < J$

C. $I > \frac{2}{3}$ and $J < 2$

D. $I > \frac{2}{3}$ and $J > 2$



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66. $\int_{\pi/8}^{3\pi/8} \frac{1}{1 + \cot x} dx =$

A. $\pi/8$

B. 2π

C. $\pi/4$

D. $\pi/2$



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$$67. \int_{-2}^2 (x^{11} \cos x + e^x) dx =$$

- A. $\sinh 2$
- B. $2 \sinh 2$
- C. $2 \cosh 2$
- D. $2 \tanh 2$



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$$68. \int_{-1}^1 \log\left(\frac{2+x}{2-x}\right) dx =$$

- A. 1
- B. 0

C. 2

D. none

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69.
$$\int_{-\pi/2}^{\pi/2} \log\left(\frac{2 - \sin \theta}{2 + \sin \theta}\right) d\theta =$$

A. 0

B. 1

C. 2

D. -1

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70.
$$\int_{-\pi/4}^{\pi/4} \left(\frac{x + \pi/4}{2 - \cos 2x}\right) dx =$$

A. $\frac{8\pi\sqrt{3}}{5}$

B. $\frac{2\pi\sqrt{3}}{9}$

C. $\frac{4\pi^2\sqrt{3}}{9}$

D. $\frac{\pi^2}{6\sqrt{3}}$



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71. $\int_{-1}^{+1} \frac{d}{dx} (\tan^{-1} 1/x) dx =$

A. $\pi/2$

B. $\pi/4$

C. $-\pi/2$

D. none



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

A. 0

B. 2

C. π

D. none



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

A. $\pi/2$

B. $(\pi/4) - 1$

C. $\pi^4/32$

D. $(\pi^4/32) + (\pi/2)$



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

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

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

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



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75. If $f''(x)$ and $f'(x)$ are continuous on $[a, b]$ then $\int_a^b x f''(x) dx =$

A. $[bf'(b) - af'(a)] - [f(b) - f(a)]$

B. $[af'(a) - bf(b)] - [f(b) - f(a)]$

C. $[bf'(b) - af'(a)] - [(b) - f(a)]$

D. $[bf'(b) + f(b)] - [af'(a) + f(a)]$



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

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

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

D. $2 \int_0^a g(x)dx$



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$$77. \int_{-1}^1 \frac{\sqrt{1+x+x^2} - \sqrt{1-x+x^2}}{\sqrt{1+x+x^2} + \sqrt{1-x+x^2}} dx =$$

A. -1

B. 0

C. 1

D. $1/2$



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$$78. \int_{-\pi}^{\pi} (\cos 2x - \sin 3x)^2 dx =$$

A. π

B. 0

C. π

D. 2π



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79. The function $F(x) = \int_0^{\pi} \log\left(\frac{1-x}{1+x}\right) dx$ is

- A. an even function
- B. an odd function
- C. a periodic function
- D. none



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

- A. $b-a$
- B. $a-b$
- C. $a+b$

D. 0



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$$81. \int_0^2 |1 - x| dx$$

A. 0

B. 1

C. $1/2$

D. $3/2$



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$$82. \int_0^2 [x - 2] dx =$$

A. 1

B. 2

C. -1

D. -2



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83. $\int_0^2 [|x| + |x - 1|] dx =$

A. 3

B. 0

C. 4

D. 2



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84. The value of $\int_{-2}^3 [1 - x^2] dx$ is

A. $\frac{28}{3}$

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

C. $\frac{7}{3}$

D. $\frac{14}{3}$



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85. $\int_0^2 \left| \cos \frac{\pi x}{2} \right| dx =$

A. $1/\pi$

B. $2/\pi$

C. $3/\pi$

D. $4/\pi$



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

A. $1 - 1/e$

B. $2(1 - 1/e)$

C. $1/e - 1$

D. none



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87. $\int_{e^{-1}}^{e^2} \left| \frac{\log x}{x} \right| dx =$

A. $3/2$

B. $5/2$

C. 3

D. 5



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88. $\int_{0.5}^{4.5} [x] dx =$

A. 3

B. 5

C. 8

D. 10



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

A. 25

B. 20

C. 15

D. 10

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90. $[y]$ is the integral part of y , then $\int_{\pi/2}^{3\pi/2} [2 \sin x] dx =$

A. $-\pi$

B. 0

C. $-\pi/2$

D. $\pi/2$

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

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

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

C. $1000(e - 1)$

D. $\frac{e - 1}{1000}$



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92. $\int_0^{100} \sin(x - [x])\pi dx =$

A. $100/\pi$

B. $200/\pi$

C. 100π

D. 200π



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93. 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



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

A. 0

B. 1

C. 2

D. π

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

A. 0

B. $-1/\pi$

C. $1/\pi$

D. $2/\pi$

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96. $\int_0^{\pi/4} \left[\sqrt{\frac{1 - \sin 2x}{1 + \sin 2x}} \right] dx =$

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

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

C. $\log 2$

D. $-\log 2$



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

A. $150\sqrt{2}$

B. $100\sqrt{2}$

C. $200\sqrt{2}$

D. $50\sqrt{2}$



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

A. $\sqrt{2}$

B. $2\sqrt{2}$

C. $3\sqrt{2}$

D. $3\sqrt{3}$



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99. The integral $\int_0^{\pi} \sqrt{1+4 \sin^2(x/2 - 4 \sin(x/2))} dx$ equals

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

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

C. $\pi - 4$

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



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

A. $\frac{3}{\pi} - \frac{1}{\pi^2}$

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

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

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



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101. $\lim_{x \rightarrow 0} \left(\frac{\int_0^x \sin^3 x}{x^4} \right) =$

A. 0.25

B. 2.5

C. 5.2

D. 0.52



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102. $\int_0^{\pi/3} |\tan x - 1| dx =$

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

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

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

D. $\frac{\pi}{6} + \frac{1}{2} \log 2$



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103. $\lim_{x \rightarrow 0} \frac{x^2}{\int_0^x \tan^{-1} t dt}$

A. 1

B. 2

C. 0

D. 4



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104.

$$\int_0^{\infty} \frac{x^2 dx}{(x^2 + a^2)(x^2 + b^2)(x^2 + c^2)} = \frac{\pi}{2(a+b)(b+c)(c+a)} \quad \text{then} \quad \int_0^{\infty} \frac{1}{(x^2 + a^2)(x^2 + b^2)(x^2 + c^2)} dx = \frac{\pi}{2(a+b)(b+c)(c+a)}$$

A. $\pi/60$

B. $\pi/20$

C. $\pi/40$

D. $\pi/80$



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105. $\int_0^{\pi/2} \frac{\sin x}{x} dx$ lies between

A. 0 and 1

B. -1 and 1

C. 1 and $\pi/2$

D. none

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106. $A(x) = \begin{vmatrix} x+1 & 2x+1 & 3x+1 \\ 2x+1 & 3x+1 & x+1 \\ 3x+1 & x+1 & 2x+1 \end{vmatrix}$ then $\int_0^1 A(x) dx =$

A. -15

B. $-\frac{15}{2}$

C. -30

D. -5



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107.

If

$$f(x) = \begin{vmatrix} 2 \cos^2 x & \sin 2x & -\sin x \\ \sin 2x & 2 \sin^2 x & \cos x \\ \sin x & -\cos x & 0 \end{vmatrix} \quad \text{then} \quad \int_0^{\pi/2} [f(x) + f'(x)] dx =$$

A. 0

B. π

C. $\pi/2$

D. none



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$$108. \text{ If } f(x) = \begin{vmatrix} \cos x & 1 & 0 \\ 1 & 2 \cos x & 1 \\ 0 & 1 & 2 \cos x \end{vmatrix} \quad \text{then} \quad \int_0^{\pi/2} f(x) dx =$$

A. $1/4$

B. $1/3$

C. $1/2$

D. $-1/3$

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109.

If

$$f(x) = \begin{vmatrix} \sin x + \sin 2x + \sin 3x & \sin 2x & \sin 3x \\ 3 + 4 \sin x & 3 & 4 \sin x \\ 1 + \sin x & \sin x & 1 \end{vmatrix}, \text{ then the value of } \int_0^{\pi/}$$

is

A. 3

B. $2/3$

C. $1/3$

D. 0

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110. $\lim_{x \rightarrow 0} \left(\frac{\int_0^x \sin^2 t \cos t dt}{x^3} \right) =$

A. 1

B. $1/3$

C. 1

D. ∞



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111. $\lim_{x \rightarrow 0} \left(\frac{\int_0^x \tan^2 t \sec^2 t dt}{x^3} \right) =$

A. 0

B. 1

C. $1/3$

D. 1/2



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112. $\lim_{x \rightarrow 0} \left(\frac{\int_0^x \cos^3 t dt}{x} \right) =$

A. 1

B. -1

C. 0

D. none



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113. 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

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

A. $1/3$

B. 1

C. $2/3$

D. none

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115. 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. none



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116. If $\int_0^\infty e^{-x^2} dx = \frac{\sqrt{\pi}}{2}$, then $\int_0^\infty e^{-ax^2} dx$, $a > 0$ is

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

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

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

D. $\frac{1}{2}\sqrt{\frac{\pi}{a}}$



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EXERCISE 1C

1. $\int_0^{\pi/2} \sin^9 x dx =$

A. $\frac{128\pi}{315}$

B. $\frac{128}{315}$

C. $\frac{\pi}{315}$

D. none



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2. $\int_0^{\pi/2} \cos^7 x dx =$

A. $\frac{14}{35}$

B. $\frac{16}{30}$

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

D. $\frac{26}{35}$

Answer: c



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3. $\int_0^{\pi/2} \cos^{10} x dx =$

A. $\frac{14}{35}$

B. $\frac{63\pi}{512}$

C. $\frac{26\pi}{35}$

D. $\frac{26}{35}$



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4. If $I_n = \int_0^{\pi/4} \tan^n \theta d\theta$ for $1, 2, 3, \dots$ then

$$I_{n-1} + I_{n+1} =$$

A. 0

B. 1

C. $1/n$

D. $1/n + 1$



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5. $\int_0^1 \frac{x^6}{\sqrt{1-x^2}} dx =$

A. $\frac{5\pi}{32}$

B. $\frac{35\pi}{1024}$

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

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



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6. $\int_0^a (a^2 - x^2)^{5/2} dx =$

A. $\frac{2\pi a^6}{32}$

B. $\frac{5\pi a^6}{32}$

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

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



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

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

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

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

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



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8. $\int_0^a x^3(ax - x^2)^{3/2} dx =$

A. $-\frac{9\pi a^7}{2048}$

B. $\frac{3\pi a^7}{2048}$

C. $\frac{9\pi a^7}{2048}$

D. $\frac{9\pi a^7}{2345}$



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9. $\int_0^1 x^4(1-x)^{5/2} dx =$

A. $\frac{1384}{45045}$

B. $\frac{84}{5045}$

C. $\frac{384}{45045}$

D. $\frac{284}{45045}$



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10. If $I_1 = \int_{1/e}^{\tan x} \frac{t}{1+t^2} dt$ and $I_2 = \int_{1/e}^{\cot x} \frac{dt}{t(1+t^2)}$ then the values of $I_1 + I_2$ is

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

B. 1

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

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



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11. The value of $I = \int_{-\pi/2}^{\pi/2} \sqrt{\cos x - \cos^3 x} dx$ is

A. 0

B. $2/3$

C. $4/3$

D. $1/3$



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12. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be a differentiable function having

$f(2) = 6, f'(2) = \frac{1}{48}$. Then $Lt_{x \rightarrow 2} \int_6^{f(x)} \frac{4t^3}{x-2} dt$

A. 24

B. 36

C. 12

D. 18

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

A. 0

B. 1

C. $\pi/4$

D. 42

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14. The value of the integral $I = \int_0^1 x(1-x)^n$ is

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

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

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

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



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15. The value of $\int_0^{\pi/2} \frac{1+2\cos x}{(2+\cos x)^2} dx$ is

A. $-1/2$

B. 2

C. $1/2$

D. none of these



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16. The value of $\int_0^{\pi} \sin^n x \cos^{2m+1} x dx$ is

A. $\frac{(2m+1)!}{(n!)^2}$

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

C. $\int_0^{\pi} \cos^{2m-1} x dx$

D. none of these



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17. The value of $\int_{-\pi}^{3\pi} \log(\sec \theta - \tan \theta) d\theta$ is

A. 1

B. 0

C. 2

D. none of these



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18. The value of $\int_0^{\pi/2} \sqrt{\sin 2\theta} \sin \theta d\theta$ is

A. 1

B. 0

C. $\pi/2$

D. $\pi/4$



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19. If $\int_0^{\infty} \frac{dx}{(x^2 + 4)(x^2 + 9)} = k\pi$ then the value of k is

A. $1/60$

B. $1/80$

C. $\frac{1}{40}$

D. $1/20$



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20. If f is an odd function then $\int_{-1}^1 [|x| + f(x) \cos x] dx =$

A. 0

B. 1

C. 2

D. none of these



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

A. π

B. 0

C. 2π

D. $\pi/2$

Answer: a



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

A. π

B. 0

C. $\pi/2$

D. none

Answer: c



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$$23. \int_0^{\infty} \left[\frac{2}{e^x} \right] dx =$$

A. $\log_e 2$

B. e^2

C. 0

D. $2/e$



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$$24. \int_0^{\pi} [\cos x] dx =$$

A. $\pi/2$

B. 0

C. π

D. $-\pi/2$

Answer: d

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25. $\int_{\pi/2}^{3\pi/2} [2 \sin x] dx =$

A. $-\pi$

B. 0

C. $-\pi/2$

D. $\pi/2$

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26. $\int_0^{\pi/4} \sin x \cdot d(x - [x]) =$

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

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

C. 1

D. none



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27. $\int_{-1}^1 (x - [2x]) dx =$

A. 1

B. 0

C. 2

D. 4



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

A. $\frac{1}{2}[x]$

B. $2[x]$

C. $\frac{1}{2[x]}$

D. none



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29. $\int_0^2 x^2 [x] dx =$

A. $5/3$

B. $7/3$

C. $8/3$

D. $4/3$



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30. $\int_0^{\pi} [\cot x] dx$, where $[\cdot]$ denotes the greatest integer function, is equal to

A. 1

B. -1

C. $-\pi/2$

D. $\pi/2$



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31. For $x \in \left(0, \frac{5\pi}{2}\right)$ define, $f(x) = \int_0^x \sqrt{t} \sin t dt$ then f has

A. local minimum at π and local maximum at 2π

B. local maximum at π local minimum at 2π

C. local maximum at π and 2π

D. local minimum at π and 2π

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

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

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

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

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

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33. The slope of the tangent to the curve $y = \int_0^x \frac{1}{1+t^3} dt$ at the point, where $x=1$ is

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

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

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

D. 1



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EXERCISE 1D

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

A. 1

B. π

C. $\pi/2$

D. $\pi/4$

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2. $\lim_{n \rightarrow \infty} \sum_{r=1}^n \frac{1}{\sqrt{4n^2 - r^2}} =$

A. $\pi/2$

B. $\pi/3$

C. $\pi/6$

D. $\pi/5$

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

A. π

B. $\pi/2$

C. $\pi/3$

D. $\pi/6$

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

A. $1 + \sqrt{5}$

B. $-1 + \sqrt{5}$

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

D. $1 + \sqrt{2}$

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

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

B. 2π

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

D. $(\pi/2) + 1$



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

A. $\log 2$

B. $\log 3$

C. 4

D. $\pi/2$



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$$7. \lim_{n \rightarrow \infty} \sum_{r=0}^{n-1} \frac{1}{n+r} =$$

A. $\log 2$

B. $\log 2$

C. $1/2 \log 2$

D. none



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$$8. \lim_{n \rightarrow \infty} \left\{ \frac{1}{n} + \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{3n} \right\} =$$

A. $p/4$

B. $\pi/6$

C. $\log 2$

D. $\log 3$



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

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

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

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

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



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10. $Lt_{n \rightarrow \infty} \left[\frac{1}{3n+1} + \frac{1}{3n+2} + \dots + \frac{1}{3n+n} \right] =$

A. $\log(2/3)$

B. $\log(3/2)$

C. $\log(4/3)$

D. none

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

A. 0

B. $-1/2$

C. $1/2$

D. none

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

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

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

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

D. none



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

A. 0

B. $1/2$

C. $1/3$

D. none



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14. $\lim_{n \rightarrow \infty} \frac{[1 + 4 + 9 + \dots + n^2]}{n^3}$

A. 2

B. 3

C. 1/2

D. 1/3



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15. $\lim_{n \rightarrow \infty} \frac{1^9 + 2^9 + 3^9 + \dots + n^9}{n^{10}} =$

A. 1/2

B. 1/5

C. 1/10

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16. Evaluate the limit .

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

A. zero

B. $1/4$

C. $1/5$

D. $1/30$

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17. $\lim_{n \rightarrow \infty} \sum_{r=1}^n \frac{1}{n} e^{r/\pi}$ is

A. e

B. e+1

C. 1-e

D. e-1

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18. $\lim_{n \rightarrow \infty} \left[\frac{1}{1+n^3} + \frac{4}{8+n^3} + \frac{9}{27+n^3} + \dots + \frac{1}{2n} \right] =$

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

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

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

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

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

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

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

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

D. $\log 2$



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20. By the definition of the definite integral, the value of

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

A. $\frac{1}{5} \log 2$

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

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

D. $\log 2$



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

A. 0

B. 1

C. $2/3$

D. $3/2$



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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. none



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23.

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

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

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

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

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



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

A. π

B. 2π

C. $\pi/2$

D. $3\pi/2$



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

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

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

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

D. $\log(\sqrt{2} - 1)$



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26.

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

A. $1/3$

B. $1/5$

C. $1/10$

D. $1/2$



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$$27. \lim_{n \rightarrow \infty} \frac{1}{n} \left\{ \sin^2 \frac{\pi}{2n} + \sin^2 \frac{2\pi}{2n} + \dots + \sin^2 \frac{n\pi}{2n} \right\}$$

A. 0

B. 1

C. $1/2$

D. 2



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

A. $4/\pi$

B. $2/\pi$

C. $3/\pi$

D. $5/\pi$



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

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

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

C. $\tan 1$

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

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

A. e

B. $1/e$

C. $4/e$

D. $8/e$



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31. Evaluate the limit .

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

A. $e^{(\pi-4)/2}$

B. $2e^{(\pi-4)/2}$

C. $\frac{e^{(\pi-4)/2}}{2}$

D. none



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32. $\lim_{n \rightarrow \infty} \left(\frac{(n+1)(n+2)\dots 3n}{n^{2n}} \right)^{1/n}$ is equal to

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

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

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

D. $3 \log 3 - 2$

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EXERCISE 1E

1. The area bounded by $y = x^2 + 2$, X-axis, $x=1$ and $x=2$ is

A. $16/3$

B. $17/3$

C. $13/3$

D. $20/3$

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2. The area of the region bounded by the curve $y = (x^2 + 2)^2 + 2x$ between the ordinates $x=0$ and $x=2$

A. $436/15$

B. $208/3$

C. $236/5$

D. $340/13$



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3. The area, in square unit, of the region bounded by the curve $x^2 = 4y$, the line $x=2$ and the x-axis is

A. 1

B. $2/3$

C. $4/3$

D. $8/3$



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4. The area (in square units) of the region bounded by $x^2 = 8y$, $x = 4$

and x-axis is

A. $2/3$

B. $4/3$

C. $8/3$

D. $10/3$



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5. The area of the region bounded by the curve $y = x^3$, x-axis and the

ordinates $x=1$, $x=4$ is

A. $255/4$

B. $155/4$

C. $55/4$

D. $355/4$



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6. The area bounded by the curve $y = 1 + 8/x^2$ with x-axis and the ordinates at $x=2$ and $x=4$ is

A. 2

B. 3

C. 4

D. 5



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7. The area under the curve $y = x^2 - 3x + 2$ with boundaries as x-axis and the ordinates $x=0, x=3$ is

A. $3/8$

B. $2/3$

C. $3/6$

D. $23/3$



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8. The area bounded by the curve $y = 4 - x^2$, $y = 0$, $y = 3$ is

A. $28/3$

B. $32/3$

C. $13/6$

D. $23/3$



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9. The area bounded by the X-axis and the curve $y = 4x - x^2 - 3$ is

A. $1/3$

B. $2/3$

C. $4/3$

D. $8/3$



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10. The area bounded by the parabola $y = (x - 4)(x - 1)$ and X-axis is

A. $9/2$

B. $6/5$

C. $3/4$

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



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11. The area bounded by the curve $y = \frac{x^2}{4} + \frac{x}{4} - \frac{1}{2}$ with X axis in $[0, 2]$ is

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

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

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

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



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12. The area of the region between $x - y + 2 = 0$ and the curve $x = \sqrt{y}$, Y-axis is

A. 9

B. $9/2$

C. $10/3$

D. none



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13. The area enclosed between the curve $y = \log_e(x + e)$ and the coordinate axes is

A. 1

B. 2

C. 3

D. 4



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14. The area of the region bounded by the curve $y = \sin x$, x -axis and the ordinates $x = 0$, $x = \pi/3$ is

A. $1/3$

B. $1/2$

C. $3/2$

D. $2/3$



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15. The area of the region bounded by the curve $y = \sin x$, x -axis in $[0, 2\pi]$ is

A. 4

B. 3

C. 2

D. 1



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16. The area bounded by the curve $y = \cos ax$ in one arc of the curve is

A. $2a$

B. $1/a$

C. $2/a$

D. $2a^2$



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17. The area under the curve $y = \sin 2x + \cos 2x$ and x-axis from $x=0$ to $x = \pi/4$ is

A. 4

B. 3

C. 2

D. 1



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18. The area bounded by the curve $y = \sin x$, $y = \cos x$ and y-axis is

A. $\sqrt{2}$

B. $\sqrt{2} + 1$

C. $\sqrt{2} - 1$

D. $\sqrt{2} + 2$



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19. The area bounded by the curves $y = \cos x$ and $y = \sin x$ between the ordinates and $x = \frac{3\pi}{2}$ is

A. $4\sqrt{2} - 2$

B. $4\sqrt{2} + 2$

C. $4\sqrt{2} - 1$

D. $4\sqrt{2} + 1$



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20. The line $x = \frac{\pi}{4}$ divides the area of the region bounded by $y = \sin x$, $y = \cos x$ and x-axis $\left(0 < x < \frac{\pi}{2}\right)$ into two regions of areas A_1 and A_2 . Then $A_1 : A_2$

A. 4 : 1

B. 3 : 1

C. 2 : 1

D. 1:1



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21. Area of the region bounded by $y = |5 \sin x|$ from $x=0$ to $x = 4\pi$ and x -axis is

A. 10

B. 20

C. 40

D. 80



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22. The area bounded by $y = \cos x$, $y = x + 1$, $y = 0$ is

A. $3/2$

B. $2/3$

C. $1/2$

D. $5/2$



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23. The ratio of the areas bounded by $y = \cos x$, $y = \cos 2x$ between $x=0$ and $x = \pi/3$ and the x-axis is

A. $2\sqrt{3}:4 - \sqrt{3}$

B. $1:2$

C. $1:1$

D. $3:1$



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24. The area of the region bounded by the curve $y = \tan x$ tangent drawn to the curve at $x = \pi/4$ and the x-axis is

A. $\log 2 - \frac{1}{4}$

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

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

D. none



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25. Area of the region bounded by the x-axis and curves $y = \tan x$ ($-\pi/3 \leq x \leq \pi/3$) and $y = \cot x$ ($\pi/6 \leq x \leq 3\pi/2$) is

A. $\log 2$

B. $2 \log 2$

C. $\log \sqrt{2}$

D. none



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26. The area bounded by the parabola $x = 4 - y^2$ and the y-axis in square units is

A. $3/32$

B. $32/3$

C. $33/2$

D. $16/3$



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27. The area (in square units) of the region bounded by the curves $2x = y^2 - 1$ and $x = 0$

A. $1/3$

B. $2/3$

C. 1

D. 2



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28. The area of the region bounded by the curve $y^2 = 4x$, y-axis and the lines $y=1, y=3$ is

A. $28/3$

B. $32/3$

C. $13/6$

D. $23/3$



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29. The area bounded by the curve $x = y^2 + 4y$ with y-axis is

A. $28/3$

B. $32/3$

C. $13/6$

D. $23/3$



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30. The area bounded by $x = 0$, $x = 6 + 5y - y^2$ is

A. $\frac{517}{6}$

B. $\frac{278}{3}$

C. $\frac{280}{3}$

D. $\frac{343}{6}$



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31. The area bounded by the curve $y^2 = 4x$ and the lines $x = 1$, $x = 9$ is

A. $\frac{436}{15}$

B. $\frac{208}{3}$

C. $\frac{236}{5}$

D. $\frac{340}{13}$



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32. The area bounded by $y^2 = 4x$ and $y = 2x - 4$ is

A. 9

B. 5

C. 4

D. 2

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33. The area of the figure bounded by the curves $y^2 = 2x + 1$ and $x - y - 1 = 0$ is

A. $2/3$

B. $4/3$

C. $8/3$

D. $16/3$

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34. The area between the curve $y^2 = 9x$ and the line $y = 3x$ is

A. $1/3$

B. $8/3$

C. $1/2$

D. $4/3$



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35. The polar of $(a,0)$ w.r.t the parabola $y^2 = 4ax$ is

A. $8a^2$

B. $4a^2$

C. $8a^2/3$

D. $4a^2/3$



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36. The area of region bounded by the curve $y^2 = 4ax$ and the line $x = a$ ($a > 0$) is

A. $2a^2/3$

B. $a^2/3$

C. $8a^2/3$

D. $4a^2/3$



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37. The area bounded by the parabola $x^2 = 4by$ and the double abscissa $y = a$ is

A. $8 \frac{a^{1/2}b^{3/2}}{3}$

B. $8 \frac{b^{1/2}a^{3/2}}{3}$

C. $4 \frac{a^{1/2}b^{3/2}}{3}$

D. $4 \frac{b^{1/2}a^{3/2}}{3}$

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38. The area bounded by the curve $x^2 = 4ay$ and the line $y = 2a$ is

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

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

C. $\frac{8a^2}{3}$

D. $\frac{16\sqrt{2}a^2}{3}$

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39. The area contained between the curve $xy = a^2$, the vertical line $x = a$, $x = 4a$ ($a > 0$) and x-axis is

A. $a^2 \log 2$

B. $2a^2 \log 2$

C. $a \log 2$

D. $2a \log 2$



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40. The area bounded by the curve $xy = 4$, x-axis and the ordinates $x = 2$, $x = 5$ is

A. $2 \log \frac{5}{2}$

B. $4 \log \frac{5}{2}$

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

D. $3 \log \frac{5}{2}$



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41. The area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ is

A. $\frac{16a^2}{3}$

B. $\frac{16a^2}{2}$

C. $\frac{10a^2}{3}$

D. $\frac{16a^2}{5}$



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42. The area included between the parabolas $y^2 = 4ax$, $x^2 = 4by$ is

A. $\frac{16ab}{3}$

B. $\frac{16}{5}ab$

C. $\frac{15}{4}$

D. none



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43. The area (in square units) bounded by the curves $y^2 = 4x$ and $x^2 = 4y$ in the plane is

A. $8/3$

B. $16/3$

C. $32/3$

D. $64/3$



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44. Find the area bounded between the curves $y = x^2$, $y = \sqrt{x}$

A. $1/3$

B. $8/3$

C. $1/2$

D. $4/3$



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45. The area of the region bounded by the curves $y = 9x^2$ and $y = 5x^2 + 4$ (in square units) is

A. 64

B. $\frac{64}{3}$

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

D. $\frac{16}{3}$



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46. If the area bounded by the curves $y = ax^2$ and $x = ay^2$, ($a > 0$) is 3 sq. units, then the value of a is

A. $2/3$

B. $1/3$

C. 1

D. 4



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47. The area bounded by the curves $y = x$, $y = x^3$ is

A. $1/4$

B. $1/6$

C. $1/12$

D. $1/2$



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48. The area of the region enclosed by the curves $y = x^2$ and $y = x^3$ is

A. $1/12$

B. $1/6$

C. $1/3$

D. 1



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49. The area in square unit bounded by the curves $y = x^3$, $y = x^2$ and the ordinates $x=1$, $x=2$ is

A. $17/12$

B. $12/13$

C. $2/7$

D. $7/2$



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50. The area bounded by $y=3x$ and $y = x^2$ is

A. 10

B. 5

C. 4.5

D. 9



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51. The area between the parabola $y = x^2$ and the line $y = 2x$ is

A. $1/3$

B. $8/3$

C. $1/2$

D. $4/3$



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52. The area bounded between the parabolas $x^2 = \frac{y}{4}$ and $x^2 = 9y$, and the straight line $y = 2$ is

A. $\frac{20\sqrt{2}}{3}$

B. $10\sqrt{2}$

C. $20\sqrt{2}$

D. $\frac{10\sqrt{2}}{3}$



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53. The area bounded by the curve $x^2 = 4y$ and the line $x = 4y - 2$ is

A. $9/8$

B. $8/3$

C. $1/2$

D. $1/3$



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54. The area of the region bounded by $y = x^2$, $y = x + 2$, $x = -1$ and $x = 2$ is

A. $9/2$

B. $8/3$

C. $1/2$

D. $1/3$



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55. The area bounded by the curve $y = x^2$ and the lines $y = 3x$, $x = 1$, $x = 3$ is

A. $9/2$

B. $8/3$

C. $1/2$

D. $10/3$



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56. The area (in square units) bounded by the curves $y = \sqrt{x}$, $2y - x + 3 = 0$, x-axis, and lying in the first quadrant is :

A. 18

B. $27/4$

C. 9

D. 36



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57. The area enclosed between the curves $y^2 = x$ and $y = |x|$ is

A. $2/3$

B. 1

C. $1/6$

D. $1/3$



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58. The area bounded by the curve $y^2 = x - 1$ and the line $y = x - 3$ is

A. $9/3$

B. $8/3$

C. $1/2$

D. $10/3$



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59. The area (in sq. units) of the region described by

$$\{(x, y) : y(2) \leq 2x \text{ and } y^2 \leq 2x \text{ and } y \geq 4x - 1\}$$

A. $\frac{7}{32}$

B. $\frac{5}{64}$

C. $\frac{15}{64}$

D. $\frac{9}{32}$



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60. The area of the region bounded by the parabola $(y - 2)^2 = x - 1$,

the tangent to the parabola at the point (2,3) and the x-axis is

A. 6

B. 9

C. 12

D. 3



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61. The area of the region bounded by the curves $y = x^2 + 2$, $y = x$, $x = 0$ and $x = 3$ is

A. $4/3$ sq. unit

B. $2/3$ sq. unit

C. $21/2$ sq. unit

D. 27 sq. unit



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62. The area (in square units) of the region bounded by $x = -1$, $x = 2$, $y = x^2 + 1$ and $y = 2x - 2$ is

A. 7

B. 8

C. 9

D. 10



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63. The area of the plane region bounded by the curves $x + 2y^2 = 0$ and $x + 3y^2 = 1$ is equal to

A. $1/3$

B. $2/3$

C. $4/3$

D. $5/3$



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64. The area of the region bounded by the curve

$\sqrt{x} + \sqrt{y} = \sqrt{a}$ ($x, y > 0$) and the coordinate axes is

A. a^2

B. $a^2/2$

C. $a^2/3$

D. $a^2/6$



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65. The area bounded by the curves $y = 3x - x^2$ and $y = x^2 - x$ is

A. $1/3$

B. $8/3$

C. $1/2$

D. $4/3$



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66. The area in the first quadrant enclosed by the axis, the line $x = y\sqrt{3}$ and the circle $x^2 + y^2 = 4$ is

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/6$



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67. The area common to the circle $x^2 + y^2 = 16a^2$ and the parabola $y^2 = 6ax$ is

A. $4a^2(8\pi - \sqrt{3})$

B. $\frac{4a^2(4\pi + \sqrt{3})}{3}$

C. $\frac{4a^2(8\pi - \sqrt{3})}{3}$

D. none



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68. The area included between the parabola $y = \frac{x^2}{4a}$ and the curve

$y = \frac{8a^3}{(x^2 + 4a^2)}$ is

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

B. $a^2\left(2\pi - \frac{8}{3}\right)$

C. $a^2\left(2\pi + \frac{4}{3}\right)$

D. $a^2\left(2\pi - \frac{4}{3}\right)$



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69. The area (in square units) of the region enclosed by the two circles

$$x^2 + y^2 = 1 \text{ and } (x - 1)^2 + y^2 = 1 \text{ is}$$

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

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

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

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



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70. The area (in sq. units) of the region

$$\{(x, y) : y^2 \geq 2x \text{ and } x^2 + y^2 \leq 4x, x \geq 0, y \geq 0\} \text{ is}$$

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

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

C. $\frac{\pi}{2} + \frac{4}{3}$

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

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71. The area (in sq. units) of the region $\{(x, y) : y^2 \geq 2x \text{ and } x^2 + y^2 \leq 4x, x \geq 0, y \geq 0\}$ is

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

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

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

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

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72. Let AOB be the positive quadrant of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with OA=a , OB=b .

Then show that the area bounded between the chord AB and the arc AB of the ellipse is $\frac{(\pi - 2)ab}{4}$

A. πab

B. $(\pi - 2)ab$

C. $\frac{(\pi - 2)ab}{2}$

D. $\frac{(\pi - 2)ab}{4}$



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73. Area of the region bounded by $y = \{x\}$, the x-axis and the ordinates $x = 1, x = 2$ is

A. 2

B. 1

C. $1/2$

D. none



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74. The area bounded by the curves $x = y^2$ and $x = 3 - 2y^2$ is

A. 3

B. 4

C. 1

D. 2



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75. The area of region bounded by the curve $y^2 = 2y - x$ and the y-axis is

- A. $4/3$ sq. unit
- B. $2/3$ sq. unit
- C. $21/2$ sq. unit
- D. 27 sq. unit



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76. The area of the region bounded by $a^2y^2 = x^2(a^2 - x^2)$ is

- A. $a^2/3$
- B. $2a^2/3$
- C. $4a^2/3$
- D. none



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77. Area of the region bounded by $y = |x|$ and $y = 2$ is

A. 4

B. 2

C. $1/2$

D. 1



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78. The area between the curve $y = 1 - |x|$ and x-axis is

A. $1/2$

B. 1

C. $1/4$

D. $1/3$

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79. The area of the region bounded by the curves $y = |x - 2|$, $x = 1$, $x = 3$ and the x-axis is

A. 1

B. 4

C. 3

D. 2

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80. Find the area enclosed with in the curve

$$|x| + |y| = 1$$

A. $\sqrt{2}$

B. 2

C. $2\sqrt{2}$

D. 4



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81. The area bounded by $\frac{|x|}{a} + \frac{|y|}{b} = 1$, where $a > 0$ and $b > 0$ is

A. $1/2ab$

B. ab

C. $2ab$

D. $4ab$



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82. The area of the region bounded by the curves

$$y = |x - 1| \text{ and } y = 3 - |x| \text{ is}$$

A. 2

B. 3

C. 4

D. 1



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83. The area of the region bounded by the curves

$$y = x^2 \text{ and } y = \frac{2}{1 + x^2} \text{ is}$$

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

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

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

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



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84. The area of the region bounded by the curves $y = ex \log x$ and $y = \frac{\log x}{ex}$ is

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

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

C. $\frac{e}{4} - 5$

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



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85. Area of the region bounded by $y = e^x$, $y = e^{-x}$ and the line $x = 1$ is

A. $e + 1/e$

B. $e - 1/e$

C. $e + e^{-1} + 2$

D. $e + e^{-1} - 2$



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86. The area of the region bounded by the curves $y = 2^x$, $y = 2x - x^2$

and the lines $x = 0$, $x = 2$ is

A. $3 \log 2 - \frac{4}{3}$

B. $\frac{3}{\log 2} - \frac{4}{3}$

C. $\frac{1}{\log 2} - \frac{4}{3}$

D. $\frac{3}{\log 2} + \frac{4}{3}$



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87. The area bounded by the curves $y = \log x$, $y = 2^x$ and the lines $x = \frac{1}{2}$, $x = 2$ is

A. $\frac{1}{\log 2}(4 - \sqrt{2}) - \frac{5}{2}\log 2 + \frac{3}{2}$

B. $\log 2(4 - \sqrt{2}) + \frac{3}{2}$

C. $\frac{5}{2}\log 2 + \frac{3}{2}$

D. none



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88. The area bounded by the curves $y = xe^x$, $y = xe^{-x}$ and line $x = 1$, is

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

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

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

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

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89. If $x=a$ divides the area bounded by x -axis, part of the curve $y = 1 + 8/x^2$ and the ordinates $x = 2, x = 4$ into equal parts then $a =$

A. 2

B. $2/\sqrt{2}$

C. $1/\sqrt{2}$

D. $2\sqrt{2}$

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90. The area bounded by the curve $y = x(x - 1)^2$, y-axis and the line $y=2$ is

A. $10/3$

B. $5/3$

C. $20/3$

D. none



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91. The area bounded by the circle $x^2 + y^2 = a^2$ and the line $x + y = a$ in the first quadrant is

A. $(\pi - 2)a^2$

B. $\frac{1}{4}(\pi - 2)a^2$

C. πa^2

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



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92. If area bounded by the curves $y^2 = 4ax$ and $y = mx$ is $a^2/3$ then the value of m is

A. 2

B. -2

C. $1/2$

D. none



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93. The parabolas $y^2 = 4x$, $x^2 = 4y$ divide the square region bounded by the lines $x = 4$, $y = 4$ and the co-ordinate axes. If S_1 , S_2 , S_3 are respectively

the areas of these parts numbered from top to bottom then $S_1 : S_2 : S_3$ is

A. 1 : 2 : 1

B. 1 : 2 : 3

C. 2 : 1 : 2

D. 1 : 1 : 1



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94. The area of the region enclosed by the curves $y = x$, $x = e$, $y = \frac{1}{x}$ and the positive x-axis is

A. $3/2$ square units

B. $5/2$ square units

C. $1/2$ square units

D. 1 square units



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EXERCISE 2 (SPECIAL TYPE QUESTIONS) CHOOSE THE CORRECT ANSWER FROM THE ALTERNATIVES 1,2,3 OR 4 GIVEN (SET-1)

$$1. \int_{\sqrt{2}/3}^{\sqrt{3}/3} \frac{dx}{\sqrt{4-9x^2}} = \frac{\pi}{36}$$

$$II \int_{-1}^1 \frac{1}{(1+x^2)^2} dx = \frac{\pi}{4} + \frac{1}{2}$$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor true



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$$2. I: \int_0^a \sqrt{a^2 - x^2} dx = \pi a^2$$

$$II: \int_0^{\pi/4} (\tan^4 x + \tan^2 x) dx = 1$$

- A. only I is true
- B. only II is true
- C. both I and II are true
- D. neither I nor true



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$$3. I: \int_0^{\pi/2} \sin^6 x \cos^5 x dx = \frac{8}{693}$$

$$II: \int_0^{\pi/4} \frac{\sin^9 x}{\cos^{11} x} dx = \frac{1}{10}$$

- A. only I is true
- B. only II is true
- C. both I and II are true

D. neither I nor true



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$$4. I: \int_0^{\pi/2} \left(2 \tan \frac{x}{2} + x \sec^2 \frac{x}{2} \right) dx = \pi$$

$$II: \int_0^1 x \tan^{-1} x dx = \frac{\pi}{4} - \frac{1}{2}$$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor true



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$$5. I : \int_0^{\pi/2} \frac{\sqrt{\cot x}}{\sqrt{\tan x} + \sqrt{\cot x}} dx = \frac{\pi}{4}$$

$$II : \int_0^{\pi/2} \frac{2 \sin x + 3 \cos x}{\sin x + \cos x} dx = \frac{\pi}{4}$$

- A. only I is true
- B. only II is true
- C. both I and II are true
- D. neither I nor true



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6. I : The area, in square unit, of region bounded by the curve $x^2 = 4y$ the line $x=2$ and the x-axis is $2/3$ sq. unit.

II : The area (in square units) of the region bounded by $x^2 = 8y$, $x = 4$ and x-axis is $8/3$ sq. unit.

- A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor true



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EXERCISE 2 (SPECIAL TYPE QUESTIONS) CHOOSE THE CORRECT ANSWER FROM THE ALTERNATIVES 1,2,3 OR 4 GIVEN (SET-2)

1. If a, b, c are the values of $\int_0^3 [x] dx$, $\int_{0.5}^{4.5} [x] dx$, $\int_0^2 [x^2] dx$ then the ascending order of a, b, c is

A. a, b, c

B. b, c, a

C. c, a, b

D. a, c, b



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2. If a, b, c are the values of $\int_0^{\pi/2} \sin^4 x dx$, $\int_0^{\pi/2} \sin^6 x dx$, $\int_0^{\pi/2} \sin^8 x dx$ then the ascending order of a, b, c is

A. a, b, c

B. b, c, a

C. c, a, b

D. c, b, a



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3. If a, b, c are the values of $\int_0^{\pi/2} \cos^5 x dx$, $\int_0^{\pi/2} \cos^7 x dx$, $\int_0^{\pi/2} \cos^9 x dx$ then the descending order of a, b, c is

A. a, b, c

B. b, c, a

C. c, a, b

D. a, c, b



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4. If a, b, c are the values of $\int_0^{\pi/2} \sin^6 x dx$, $\int_0^{\pi} \sin^6 x dx$, $\int_0^{2\pi} \sin^6 x dx$

then the ascending order of a, b, c is

A. a, b, c

B. b, c, a

C. c, b, a

D. a, c, b



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5. If a, b, c are the values of $\int_0^{\pi/2} \sin^6 x dx$, $\int_0^{\pi} \sin^6 x dx$, $\int_0^{2\pi} \sin^6 x dx$

then the ascending order of a, b, c is

A. a, b, c

B. b, c, a

C. c, b, a

D. a, c, b

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EXERCISE 2 (SPECIAL TYPE QUESTIONS) CHOOSE THE CORRECT ANSWER FROM THE ALTERNATIVES 1,2,3 OR 4 GIVEN (SET-3)

1. Match the following.

$$I \quad \int_0^{\pi/2} \sqrt{1 - \cos 2x} dx = \quad (a) \quad 2$$

$$II \quad \int_0^{\pi/2} \sqrt{1 + \sin 2x} dx = \quad (b) \quad \sqrt{2}$$

$$III \quad \int_0^1 \frac{x}{1+x^2} dx = \quad (c) \quad \log 2$$

$$IV \quad \int_0^{\pi/2} \frac{\cos x}{1 + \sin x} dx = \quad (d) \quad \frac{1}{2} \log 2$$

A. a, b, c, d

B. b, c, a, d

C. b, a, d, c

D. c, d, b, a



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EXERCISE 2 (SPECIAL TYPE QUESTIONS) CHOOSE THE CORRECT ANSWER FROM THE ALTERNATIVES 1,2,3 OR 4 GIVEN (SET-4)

$$1. A: \int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx = \frac{\pi}{4}$$

$$R: \int_0^{\pi/2} \frac{f(\sin x)}{f(\sin x) + f(\cos x)} dx = \frac{\pi}{4}$$

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



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2.

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

$$R: \int_0^{\pi/2} \frac{a \tan x + b \cot x}{\tan x + \cot x} dx = \frac{\pi}{2}$$

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

D. A is false but R is true



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3. A: $\int_0^{100\pi} \sqrt{1 - \cos 2x} dx = 200\sqrt{2}$.

If $f(x)$ is a periodic function with period a then

$$\int_0^{na} f(x) dx = n \int_0^a f(x) dx$$

A. Both A and R are true R is the correct explanation of A

B. Both A and R are true but R is not correct explanation of A

C. A is true but R is false

D. A is false but R is true



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$$4. A: \int_0^{\pi/2} \sin^7 x dx = \frac{16}{35}$$

$$R: \int_0^{\pi/2} \sin^n x dx = \frac{n-1}{n} \cdot \frac{n-3}{n-2} \cdot \frac{n-5}{n-4} \cdots \frac{2}{3} \cdot 1 \text{ if } n \text{ is odd.}$$

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



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$$5. A: \int_0^{\pi/4} (\tan^6 x + \tan^4 x) dx = \frac{1}{5}$$

$$R: \int_0^{\pi/4} (\tan^n x + \tan^{n-2} x) dx = \frac{1}{n-1}$$

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

D. A is false but R is true



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



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7. A : The area of the region bounded by $y^2 = 4x$, $x^2 = 4y$ is $16/3$

R: The area of the region bounded by $y^2 = 4ax$, $x^2 = 4by$ is $16ab/3$

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



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8. A : The area of the ellipse $9x^2 + 4y^2 = 36$ is 6π sq. uint.

R: The area of the ellipse $x^2/a^2 + y^2/b^2 = 1$ is πab sq. unit.

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

D. A is false but R is true



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