

MATHS

BOOKS - SAI MATHS (TELUGU ENGLISH)

DEFINITE INTEGRALS

Problems

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

Answer: D

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

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

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

C. π^2

D. $2\pi^2$

Answer: C



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

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

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

C. $\pi - 1$

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

Answer: A



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

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

B. $\log 2$

C. $\log 3$

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

Answer: D



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

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

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

C. 0

D. -1

Answer: C

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6. The area of the region described by

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

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

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

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

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

Answer: C



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

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

is

A. $\log 2$

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

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

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

Answer: B



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8. $\int_0^{\pi/6} \cos^4 3\theta \cdot \sin^2 6\theta d\theta$ equals to

A. $\frac{\pi}{96}$

B. $\frac{5}{192}$

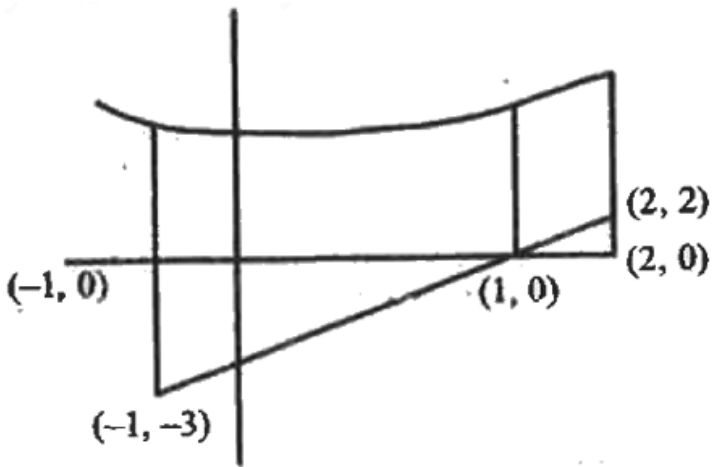
C. $5\frac{\pi}{256}$

D. $5\frac{\pi}{192}$

Answer: D

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



A. 10

B. 7

C. 8

D. 9

Answer: D



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10. $\int_0^b \frac{dx}{1+x^2} = \int_b^\infty \frac{dx}{1+x^2}$, then b is equal to

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

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

C. $\sqrt{2}$

D. 1

Answer: D



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11. The area (in sq. units) bounded by the curves $x = -2y^2$ and $x = 1 - 3y^2$ is

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

B. 1

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

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

Answer: C



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12. If $a > 0$, then $\int_{-\pi}^{\pi} \frac{\sin^2 x}{1 + a^x} dx$ is equal to

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

B. π

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

D. $a\pi$

Answer: A



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

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

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

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

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

Answer: B



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14. The area (in square units) of the region bounded by the curves $x = y^2$ and $x = 3 - 2y^2$ is

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

B. 2

C. 3

D. 4

Answer: D



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

$I_{n-1} + I_{n+1}$ is equal to

A. 0

B. 1

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

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

Answer: C



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16. If $I_n = \int_0^{\pi/2} \tan^n x dx$, then $I_2 + I_4, I_3 + I_5, I_4 + I_6$
....., are in

A. arithmetic progression

B. geometric progression

C. harmonic progression

D. arithmetic-geometric progression

Answer: C

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17. The area (in square units) of the region enclosed by the two circles $x^2 + y^2 = 1$ and $(x - 1)^2 + y^2 = 1$ 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. $\frac{2\pi}{3} - \frac{\sqrt{3}}{2}$

Answer: D



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

A. 1

B. 2

C. -1

D. -2

Answer: B



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

Then A_1, A_2 equals

A. 4: 1

B. 3: 1

C. 2: 1

D. 1: 1

Answer: D



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20. $\int_0^1 x^{3/2} \sqrt{1-x} dx$ is equal to

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

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

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

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

Answer: D



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

A. 0

B. 1

C. 2

D. π

Answer: C



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22. The area (in sq unit) of the region bounded by the curves $2x = y^2 - 1$ and $x = 0$ is

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

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

C. 1

D. 2

Answer: B



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23. If $f(t) = \int_{-t}^t \frac{e^{-|x|}}{2} dx$, then $\lim_{t \rightarrow \infty} f(t)$ is equal to

A. 1

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

C. 0

D. -1

Answer: A



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24. $\int_0^{2x} \sin^6 x \cos^5 x dx$ is equal to

A. 2π

B. $\pi/2$

C. 0

D. $-\pi$

Answer: C



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25. The area (in sq. unit) of the region enclosed by the curves $y = x^2$ and $y = x^3$ is

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

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

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

D. 1

Answer: A

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

A. π

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

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

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

Answer: C



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27. $\int_{-1}^1 \frac{\cosh x}{1 + e^{2x}} dx$ is equal to

A. 0

B. 1

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

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

Answer: C



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28. $\int_0^{\pi/2} \frac{200 \sin x + 100 \cos x}{\sin x + \cos x} dx$ is equal to

A. 50π

B. 25π

C. 75π

D. 150π

Answer: C



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29. $\int_0^{\pi} \frac{\theta \sin \theta}{1 + \cos^2 \theta} d\theta$ is equal to

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

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

C. π^2

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

Answer: D

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30. The area (in sq. unit) bounded by the curves $y^2 = 4x$ and $x^2 = 4y$ in the plane, is

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

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

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

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

Answer: B



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31. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \log\left(\frac{2 - \sin \theta}{2 + \sin \theta}\right) d\theta$ is equal to

A. 0

B. 1

C. 2

D. -1

Answer: A



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

A. $\frac{16}{3}$ sq. unit

B. $\frac{17}{3}$ sq. unit

C. $\frac{13}{3}$ sq. unit

D. $\frac{20}{3}$ sq. unit

Answer: C



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33. $\int_0^2 \frac{2x - 2}{2x - x} dx$ is equal to

A. 0

B. 2

C. 3

D. 4

Answer: A



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34. $\int_{-2}^2 |[x]| dx$ is equal to

A. 1

B. 2

C. 3

D. 4

Answer: D

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

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

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

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

D. π

Answer: B

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36. $\int_0^3 \frac{3x + 1}{x^2 + 9} dx$ is equal to

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

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

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

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

Answer: A



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37. $\int_2^3 \frac{dx}{x^2 - x}$ is equal to

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

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

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

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

Answer: B



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38. $\int_{-\pi/2}^{\pi/2} \sin^4 x \cos^6 x dx$ is equal to

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

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

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

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

Answer: B

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39. $\int_0^{\pi/2} \sin^8 x \cos^2 x dx$ is equal to

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

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

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

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

Answer: D

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40. $\int_0^1 (ax^3 + bx) = 0$ for

A. Any value of a and b

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

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

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

Answer: A



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41. The area (in sq. unit) of the region bounded by $x^2 = 8y$, $x = 4$ and x-axis is

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

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

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

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

Answer: C



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42. Evaluate $\int_{-1}^1 f(x) dx$, where

$$f(x) = (1, 2x, x \leq 0), (1 + 2x, x \geq 0)$$

A. 0

B. 2

C. 4

D. 16

Answer: C



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