INTEGRALS

1. The value of the integral $\int_1^3 |(x-1)(x-2)(x-3)|\,dx$ is

(a) $\frac{1}{3}$ (b) $\frac{9}{2}$

(c) $\frac{9}{4}$ (d) *none*

2. The value of the integral $\int_0^2 |x^3-3x^2+2x|\,dx$

(a) $\frac{1}{2}$ (b) $\frac{1}{4}$

(c) $\frac{1}{16}$ (d) *none*

3. $\int_{-1}^{3/2} |x\sin\pi x|\,dx$ is equal to

(a) $\frac{1}{\pi}\left(1+\frac{1}{\pi}\right)$ (b) $\frac{1}{\pi}\left(1-\frac{1}{\pi}\right)$

(c) $\frac{1}{\pi}\left(\frac{1}{\pi}-1\right)$ (d) *none*

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

(a) $10-2\sqrt{3}-2\sqrt{2}$ (b) $10+2\sqrt{3}-2\sqrt{2}$

(c) $10-2\sqrt{3}+2\sqrt{2}$ (d) *none*

5. $\int_0^{n^2}\left[\sqrt{x}\right]dx$ is equal to

(a) $\frac{n(n+1)(4n+1)}{6}$ (b) $\frac{n(n-1)(4n+1)}{6}$

(c) $\frac{n(n-1)(4n-1)}{6}$ (d) *none*

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

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{6}$

(c) $\frac{\pi}{12}$ (d) *none*

7. If $\int_0^{\pi}\log\sin x\,dx = k$ then the value of $\int_0^{\pi/4}\log(1+\tan x)\,dx$ is

(a) $-\frac{k}{4}$ (b) $\frac{k}{4}$

(c) $-\frac{k}{8}$ (d) $\frac{k}{8}$

8. The value of the integral $\int_{-1/2}^{1/2}\sqrt{\left(\frac{x+1}{x-1}\right)^2+\left(\frac{x-1}{x+1}\right)^2-2}\,dx$ is

(a) $2\log\frac{4}{3}$ (b) $4\log\frac{4}{3}$

(c) $\log\frac{4}{3}$ (d) *none*

9. $\int_{-20\pi}^{20\pi}|\cos x|\,dx$ is equal to

(a) 40 (b) 20

(c) 60 (d) none

10. $\int_{\pi}^{10\pi}|\sin x|\,dx$ is equal to

(a) 18 (b) 20

(c) 40 (d) none

11. If *f(x)* is an odd function, then $\int_a^x f(t)dt$ is

(a) odd (b) even

(c) neither even nor odd

12. The value of the integral $\int_{-2}^{3}\left[\cot^{-1}\left(\frac{x-1}{x+1}\right)+\cot^{-1}\left(\frac{x+1}{x-1}\right)\right]$ is

(a) $\frac{5\pi}{2}$ (b) $\frac{3\pi}{2}$

(c) $\frac{\pi}{2}$ (d) *none*

13. If $f(x)=\dfrac{x^9-3x^5+7x^3-x+1}{\cos^2 x}$, then $\int_{-\pi/4}^{\pi/4} f(x)dx$ is equal to

(a) 0 (b) $\dfrac{\pi}{2}$

(c) 2 (d) 1

14. The area bounded by the semi-circle $y=\sqrt{4-x^2}$ and its diameter y=0 is

(a) 2π (b) π

(c) $\dfrac{\pi}{2}$ (d) *none*

15. The area bounded by $y=\log_e x, x-axis$ and the ordinate $x=e$ is given by

(a) 4 (b) ½

(c) 1 (d) none

16. The area bounded by the curve $y=\sin^{-1}x$ and the lines $x=0, |y|=\dfrac{\pi}{2}$ is

(a) 2

(b) 4

(c) 8

(d) 16

17. The value of the integral $\int_0^{2[x]}(x-[x])dx$ is

(a) [x]

(b) ½ [x]

(c) 3 [x]

(d) 2 [x]

18. $\lim_{n\to\infty}\dfrac{1}{n}\sum_{r=1}^{n}\sin^{2k}\dfrac{r\pi}{2n}$ =

(a) $\dfrac{2k!}{2^{2k}(k!)^2}$ (b) $\dfrac{2k!}{2^k(k!)}$

(c) $\dfrac{2k!}{2^k(k!)^2}$ (d) *none*

19. $\lim_{n\to\infty}\left[\left(1+\dfrac{1}{n}\right)\left(1+\dfrac{2}{n}\right)....\left(1+\dfrac{n}{n}\right)\right]^{1/n}$ =

(a) $\dfrac{2}{e}$ (b) $\dfrac{e}{2}$

(c) $\dfrac{e}{4}$ (d) $\dfrac{4}{e}$

20. $\lim_{n\to\infty}\left[\left(1+\dfrac{1^2}{n^2}\right)\left(1+\dfrac{2^2}{n^2}\right)...\left(1+\dfrac{n^2}{n^2}\right)\right]^{1/n}$ =

(a) $2e^{\frac{\pi+4}{2}}$ (b) $e^{\frac{\pi+4}{2}}$

(c) $2e^{\frac{\pi-4}{2}}$ (d) $e^{\frac{\pi-4}{2}}$

21. The area bounded by the curves $y=sinx$ and $y=cosx$ between two consecutive points of their intersection is

(a) $\sqrt{2}$ (b) $2\sqrt{2}$

(c) $3\sqrt{2}$ (d) *none*

22. The area bounded by the parabolas $y^2=5x+6$ and $x^2=y$ is

(a) $19/5$ (b) $21/5$

(c) $23/5$ (d) $27/5$

23. The area bounded by the circle $x^2+y^2=8$, the parabola $x^2=2y$ and the line $y=x$ in $y\geq 0$ is

(a) $\dfrac{2}{3}+2\pi$ (b) $\dfrac{2}{3}-2\pi$

(c) $\dfrac{2}{3}+\pi$ (d) $\dfrac{2}{3}-\pi$

24. Area of the ellipse represented by $3x^2+4xy+3y^2=1$ is equal to

(a) $\dfrac{\pi}{\sqrt{5}}$ *sq.units* (b) $\dfrac{\pi}{3\sqrt{5}}$ *sq.units*

(c) $\dfrac{\pi}{2\sqrt{5}}$ *sq.units* (d) $\dfrac{\pi}{4\sqrt{5}}$ *sq.units*

25. Area bounded by $y=\sin^{-1}x, y=\cos^{-1}x$ and *y-axis* is equal to

(a) $2+\sqrt{2}$ *sq.units*

(b) $2-\sqrt{2}$ *sq.units*

(c) $1+\sqrt{2}$ *sq.units*

(d) $\sqrt{2}-1$ *sq.units*

26. Area bounded by $y=\tan^{-1}x, y=\cot^{-1}x$ and *y-axis* is equal to

(a) $\ln\sqrt{2}$ *sq.units*

(b) $\ln 4$ *sq.units*

(c) $\ln 8$ *sq.units*

(d) $\ln 2$ *sq.units*

27. The solution of the differential equation $ydx+\left(x+x^2y\right)dy=0$ is

(a) $\frac{1}{xy}+\log y=c$

(b) $-\frac{1}{xy}+\log y=c$

(c) $-\frac{1}{xy}=c$

(d) $\log y=cx$

28. If $\left(\frac{2+\sin x}{1+y}\right)\frac{dy}{dx}=-\cos x, y(0)=1$, then $y\left(\frac{\pi}{2}\right)=$

(a) 1 (b) $\frac{1}{2}$

(c) $\frac{1}{3}$ (d) $\frac{1}{4}$

29. Solution of the equation $\left(1+e^{x/y}\right)dx+e^{x/y}\left(1-\frac{x}{y}\right)dy=0$ is

(a) $x+ye^{x/y}=c$ (b) $x-ye^{x/y}=c$

(c) $y+xe^{x/y}=c$ (d) *none*

30. The solution of the equation $y\sin x\frac{dy}{dx}=\cos x\left(\sin x-\frac{y^2}{2}\right)$ given $y=1$ when $x=\frac{\pi}{2}$ is

(a) $y^2=\sin x$

(b) $y^2=2\sin x$

(c) $x^2=\sin y$

(d) $x^2=2\sin y$

31. Differential equation of $y=\sec\left(\tan^{-1}x\right)$ is

(a) $\left(1+x^2\right)\frac{dy}{dx}=y+x+c$

(b) $\left(1+x^2\right)\frac{dy}{dx}=y-x+c$

(c) $\left(1+x^2\right)\frac{dy}{dx}=xy+c$

(d) $\left(1+x^2\right)\frac{dy}{dx}=\frac{x}{y}+c$

32. Solution of the equation $xdx+ydy+\frac{xdy-ydx}{x^2+y^2}=0$ is

(a) $y=x\tan\left(\frac{c+x^2+y^2}{2}\right)$

(b) $x=y\tan\left(\frac{c+x^2+y^2}{2}\right)$

(c) $y=x\tan\left(\frac{c-x^2-y^2}{2}\right)$

(d) none

33. The general solution of the differential equation $\left(1+\tan y\right)\left(dx-dy\right)+2xdy=0$ is

(a) $x\left(\sin y+\cos y\right)=\sin y+ce^{y}$

(b) $x\left(\sin y+\cos y\right)=\sin y+ce^{-y}$

(c) $y\left(\sin x+\cos x\right)=\sin x+ce^{x}$

(d) *none*

34. Solution of the equation $\frac{dy}{dx}=e^{x-y}\left(e^{x}-e^{y}\right)$ s

(a) $e^y = e^x - 1 + ce^{-e^x}$

(b) $e^y = e^x - 1 + ce^{e^x}$

(c) $e^x = e^y - 1 + ce^{-e^y}$

(d) *none*

35. The differential equation of all circles passing through the origin and having their centres on the x-axis is

(a) $y^2 = x^2 + 2xy\dfrac{dy}{dx}$

(b) $y^2 = x^2 - 2xy\dfrac{dy}{dx}$

(c) $x^2 = y^2 + xy\dfrac{dy}{dx}$

(d) none of these

36. The differential equation that represents all parabolas each of which has a latus rectum 4a and whose axes are parallel to x-axis, is

(a) $a\dfrac{d^2y}{dx^2} + \left(\dfrac{dy}{dx}\right)^3 = 0$

(b) $2a\dfrac{d^2y}{dx^2} + \left(\dfrac{dy}{dx}\right)^3 = 0$

(c) $2a\dfrac{d^2y}{dx^2} - \left(\dfrac{dy}{dx}\right)^3 = 0$

(d) none

37. The order and degree of the differential equation $\left(1+3\dfrac{dy}{dx}\right)^{2/3} = 4\dfrac{d^3y}{dx^3}$ are

(a) $\left(1, \dfrac{2}{3}\right)$ (b) $(3,1)$

(c) $(3,3)$ (d) $(1,2)$

38. The degree and order of the differential equation of the family of all parabolas whose axis is x-axis, are respectively

(a) 2,1 (b) 1,2

(c) 3,2 (d) 2,3

39. The solution of the equation $\dfrac{d^2y}{dx^2} = e^{-2x}$ is y =

(a) $\dfrac{e^{-2x}}{4}$

(b) $\dfrac{e^{-2x}}{4} + cx + d$

(c) $\dfrac{1}{4}e^{-2x} + cx^2 + d$

(d) *none*

40. Solution of the differential equation $\left(x + 2y^3\right)\dfrac{dy}{dx} = y$ is

(a) $x = y^2\left(c + y^2\right)$ (b) $x = y\left(c - y^2\right)$

(c) $x = 2y\left(c - y^2\right)$ (d) $x = y\left(c + y^2\right)$

41. The solution of the differential equation $\left(1+y^2\right) + \left(x - e^{\tan^{-1}y}\right)\dfrac{dy}{dx} = 0$ is

(a) $\left(x-2\right) = ke^{-\tan^{-1}y}$

(b) $2xe^{\tan^{-1}y} = e^{2\tan^{-1}y} + k$

(c) $xe^{\tan^{-1}y} = \tan^{-1}y + k$

(d) $xe^{2\tan^{-1}y} = e\tan^{-1}y + k$

42. $\displaystyle\int \frac{\sqrt[3]{x^2} + \sqrt[4]{x} + \sqrt[3]{x}}{\sqrt{x}}\,dx =$

(a) $\dfrac{6}{7}x^{7/6} + \dfrac{4}{3}x^{3/4} + \dfrac{6}{5}x^{5/6} + c$

(b) $-\dfrac{6}{5}x^{5/6} + \dfrac{4}{3}x^{3/4} - \dfrac{6}{5}x^{7/6} + c$

(c) $\dfrac{6}{5}x^{1/6} + \dfrac{4}{5}x^{3/4} - \dfrac{6}{5}x^{5/6} + c$

(d) none of these

43. $\displaystyle\int \frac{10x^9 + 10^x \log_e 10}{10^x + x^{10}}\,dx$ will be given by

(a) $10^x - x^{10}$

(b) $10^x + x^{10}$

(c) $(10^x - x^{10})$

(d) $\log(10^x + x^{10})$

44. $\displaystyle\int \frac{e^{\sin(\log x)}\cos(\log x)}{x}\,dx =$

(a) $\frac{e^{\sin(\log x)}}{x}+c$ (b) $e^{\cos(\log x)}+c$

(c) $e^{\sin(\log x)}+c$ (d) none of these

45. $\int \frac{\sqrt{\tan x}}{2\sin x\cos x}dx$ is equal to

(a) $\sqrt{\tan x}$ (b) $2\sqrt{\tan x}$

(c) $\frac{1}{2}\sqrt{\tan x}$ (d) $\frac{1}{2}\tan x$

46. $\int e^{e^{e^x}}\cdot e^{e^x}\cdot e^x dx$ is equal to

(a) $\frac{1}{2}2e^{e^x}$ (b) $\left(e^{e^{e^x}}\right)^2$

(c) $e^{e^{e^x}}$ (d) $\frac{1}{2}e^{e^{e^x}}$

47. If $I=\int \sec^4 x\cos ec^2 x dx$ =

$K\tan^3 x+L\tan x+M\cot x+\text{cosnt}$, then

(a) $K=\frac{1}{3}, L=1, M=2$

(b) $K=\frac{1}{3}, L=2, M=-1$

(c) $K=-1, L=0, M=1$

(d) none of these

48. $\int \frac{(\sqrt{x^2+1})[\log(x^2+1)-2\log x]}{x^4}dx$ is equal to

(a) $\frac{1}{3}\left(1+\frac{1}{x}\right)^{1/2}\left[\log\left(1+\frac{1}{x^2}\right)+\frac{2}{3}\right]+c$

(b) $-\frac{1}{3}\left(1+\frac{1}{x}\right)^{3/2}\left[\log\left(1+\frac{1}{x^2}\right)-\frac{2}{3}\right]+c$

(c) $\frac{2}{3}\left(1+\frac{1}{x^2}\right)^{3/2}\left[\log\left(1+\frac{1}{x^2}\right)+\frac{2}{3}\right]+c$

(d) none of these

49. $\int(\sqrt{\tan x}+\sqrt{\cot x})dx=$

(a) $\sqrt{2}\sin^{-1}(\sin x-\cos x)+c$

(b) $\sqrt{2}\sin^{-1}(\sin x+\cos x)+c$

(c) $\sqrt{2}\tan^{-1}(\sin x-\cos x)+c$

(d) none of these

50. $\int \frac{\cos^{-1}\sqrt{x}-\sin^{-1}\sqrt{x}}{\cos^{-1}\sqrt{x}+\sin^{-1}\sqrt{x}}dx=$

(a) $x\left(1-\frac{4}{\pi}\sin^{-1}\sqrt{x}\right)+c$

(b) $\frac{2}{\pi}(\sin^{-1}\sqrt{x}-\sqrt{x}\sqrt{1-x})+c$

(c) $x\sin^{-1}\sqrt{x}+c$

(d) $x\left(1-\frac{4}{\pi}\sin^{-1}\sqrt{x}\right)$

Answers

1. (b)	**2.** (a)	**3.** (a)	**4.** (a)	**5.** (b)	**6.** (c)	**7.** (c)	**8.** (b)	**9.** (d)	**10.** (a)
11. (b)	**12.** (a)	**13.** (c)	**14.** (a)	**15.** (c)	**16.** (a)	**17.** (a)	**18.** (a)	**19.** (d)	**20.** (c)
21. (b)	**22.** (d)	**23.** (a)	**24.** (a)	**25.** (b)	**26.** (d)	**27.** (b)	**28.** (c)	**29.** (a)	**30.** (a)
31. (c)	**32.** (a)	**33.** (b)	**34.** (a)	**35.** (a)	**36.** (b)	**37.** (d)	**38.** (b)	**39.** (b)	**40.** (d)
41. (b)	**42.** (a)	**43.** (d)	**44.** (c)	**45.** (a)	**46.** (c)	**47.** (b)	**48.** (b)	**49.** (a)	**50.** (d)