

Answer Elementary Exercise

1. $2^{1/3} \cdot 3^{1/2}$

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

3. $2\sqrt{e}$

4. $2 - \frac{\pi}{2}(a - 3b)$

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

6. $e - \frac{2}{\ln 2}$

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

8. $\ln \frac{4}{3}$

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

10. $\frac{\pi \ln 3}{2}$

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

12. $\frac{\sqrt{3}}{2} - 1 + \frac{\pi}{6}$

13. $\frac{\pi - 3}{16}$

14. $\frac{2}{3} \tan^{-1} \frac{1}{3}$

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

16. $\frac{\theta}{\sin \theta}$

17. $\frac{1}{2} \left(\frac{\pi}{6} + \ln 3 - \ln 2 \right)$

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

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

20. $\frac{1}{2} \ln(2 + \sqrt{3})$

21. $\frac{1}{4} \ln \frac{32}{17}$

22. $\frac{1}{3} \frac{a^3 - b^3}{a^2 - b^2}$

23. (a) $2(\sqrt{2} + 1)$; (b) $\left(\pi - \frac{\pi^2}{4} \right)$

24. $\frac{\pi}{4} \left(\frac{\pi}{4} - 1 \right) + \frac{1}{2} \ln 2$

25. 13

26. $\frac{\alpha}{2 \sin \alpha}$ if $\alpha \neq 0$; $\frac{1}{2}$ if $\alpha = 0$

27. 1

28. 0

29. $\frac{3\pi + 8}{24}$

30. 2009

31. $\frac{1}{20} \ln 3$

32. $-\frac{4}{9}$

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

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

35. $\frac{16}{9}$

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

37. $\frac{2}{1+e}$

38. $\ln 2$

39. $\sqrt{2}$

40. 3

41. $|b| - |a|$

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

43. $\pi/3$

44. $1 - \frac{3}{2\sqrt{2}}$

45. (a) 48, (b) $2/3$

Answer Ex-I**SINGLE CORRECT (OBJECTIVE QUESTIONS)**

1. A	2. C	3. C	4. D	5. A	6. C	7. A
8. B	9. C	10. A	11. A	12. D	13. C	14. C
15. D	16. B	17. D	18. B	19. C	20. C	21. D
22. D	23. A	24. B	25. C	26. B	27. B	28. B
29. A	30. C	31. B	32. D	33. D	34. B	35. D
36. D	37. C	38. B	39. C	40. A	41. A	42. A
43. A	44. B	45. A	46. C	47. A	48. A	49. C
50. C	51. A	52. B	53. B	54. C	55. C	56. D
57. C	58. D	59. A	60. A	61. B	62. B	63. B
64. A	65. A	66. A	67. A	68. C	69. B	70. C
71. C	72. D	73. B	74. A	75. B	76. B	77. C
78. C	79. C	80. B	81. A	82. C	83. A	84. D
85. C	86. D	87. B				

Answer Ex-II**MULTIPLE CORRECT (OBJECTIVE QUESTIONS)**

1. A,B,C	2. A,B	3. A,C	4. A,B,C,D	5. A,D	6. A,D	7. C,D
8. A,B	9. B,C	10. A,B,C,D	11. A,B			

Answer Ex-III**SUBJECTIVE QUESTIONS**

1. (i) π (ii) $\frac{\pi}{4}$ (iii) $4 + \ln 5$ 3. (i) $5 - \sqrt{2} - \sqrt{3}$ (ii) $\cos 1 + \cos 2 + \cos 3 + 3$
4. (i) $2e - 2$ (ii) $2 - \sqrt{2}$ (iii) 29 (iv) $\frac{\pi^2}{6\sqrt{3}}$ 5. (i) $\frac{\pi}{2} - \ln 2$ (ii) $\frac{4 - \pi}{4\sqrt{2}}$ (iii) $\frac{\pi}{6} - \frac{2}{9}$ (iv) $\pi \left(1 - \frac{1}{\sqrt{3}}\right) - \ln 4$
6. (i) $\frac{\pi}{2}$ (ii) $\frac{8}{21}$ (iii) $\frac{1}{20} \ln 3$ 7. (i) π (ii) $\frac{\pi}{8} (b - a)^2$ 8. (i) $\frac{\pi}{4}$ (ii) $\frac{\pi}{4}$ (iii) $\frac{a}{2}$ (iv) $(a + b) \frac{\pi}{4}$
9. (i) $\frac{3}{2}$ (ii) 40 11. $4\sqrt{2}$ 14. (i) $\frac{\pi}{2}$ (ii) 215.0 18. $F(x) = \begin{cases} x - \frac{x^2}{2} & \text{if } 0 \leq x \leq 1 \\ \frac{1}{2} & \text{if } 1 < x \leq 2 \\ \frac{(x-2)^3}{3} + \frac{1}{2} & \text{if } 2 < x \leq 3 \end{cases}$
19. $-\frac{2}{\pi^2} \cos \pi x$ for $0 < x < 1$; $\frac{2}{\pi^2}$ for $x \geq 1$ & $-\frac{2}{\pi^2}$ for $x \leq 0$ 20. (i) 0 (ii) $\frac{p^2}{1+p^2}$
22. $\frac{1}{\sqrt{11}} \ln \frac{\sqrt{11}+1}{\sqrt{11}-1}$ 23. $\frac{n}{n^2-1}$ 24. $\frac{19}{72}$ 27. $\frac{\pi^2}{6}$ 28. $\ln 2$ 29. $6 - 2e$ 30. $\frac{\pi}{2} - 1$
31. $\frac{\pi}{8} \ln 2$ 32. 125 33. $2\sqrt{6}$ 34. $2\sqrt{2} + \sqrt{2} + \frac{4}{3}(3\sqrt{3} - 2\sqrt{2})$ 36. $\left(\frac{22}{7} - \pi\right)$ 37. $\frac{\pi}{8} (1 - \ln 4)$
38. $4\sqrt{2} - 4 \ln(\sqrt{2} + 1)$ 39. $\frac{\pi\sqrt{3}}{3}$ 40. $\frac{\pi(a+b)}{2\sqrt{2}}$ 41. $\frac{2\pi}{\sqrt{3}}$

Answer Ex-IV**ADVANCED SUBJECTIVE QUESTIONS**

1. $-\frac{3\sqrt{2}}{5} (e^{2\pi} + 1)$ 2. $\frac{1}{3} \left(\arctan \frac{\sqrt{2}}{3} - \arctan \frac{1}{3} \right)$ 3. $\frac{(a\pi + 2b)\pi}{3\sqrt{3}}$ 4. $\frac{\pi(\pi + 3)}{2}$ 5. $\frac{\pi^2}{6\sqrt{3}}$
6. $\frac{3\pi^2}{16}$ 7. $\frac{\pi}{12}$ 8. real & distinct $\forall k \in \mathbb{R}$ 9. $\frac{\pi a^2}{4}$ 10. 4 11. $-\frac{2\pi^2}{3} \ln 2$
12. $\frac{\pi^2}{16} - \frac{\pi}{4} \ln 2$ 13. $\frac{5\pi}{27}$ 14. $\frac{1}{2} \left[\ln 2 + \frac{\pi}{2} - 1 \right]$ 15. $\frac{16\pi}{3} - 2\sqrt{3}$ 16. 2007 17. $\frac{\pi + 4}{666}$
18. 2525 19. $\frac{\pi^2}{8} - \frac{\pi}{4} - (1 + \ln 2) + \frac{1}{2}$ 20. $\left\{ -\frac{\pi}{2}, \frac{\pi}{2} \right\}$ 21. cont. & diff. at $x = 0$
22. $g(x)$ is cont. in $(-2, 2)$; $g(x)$ is diff. at $x = 1$ & not diff. at $x = 0$. Not that ;

$$g(x) = \begin{cases} -(x+2) & \text{for } -2 \leq x \leq 0 \\ -2+x-\frac{x^2}{2} & \text{for } 0 < x < 1 \\ \frac{x^2}{2} - x - 1 & \text{for } 1 \leq x \leq 2 \end{cases}$$

23. (c) $a = \frac{2\pi}{13}$ & $b = \frac{2\pi}{7}$ 24. $1 + e$ 25. $f(x) = x + \frac{61}{119}x + \frac{80}{119}x^2$
26. (a) $c = 1$ and $\lim_{x \rightarrow \infty}$ will be $\frac{\sqrt{3}}{2}$ 27. (b) $a = 4$ and $b = 1$ 28. 13.5 29. $b\beta - a\alpha$
30. (a) $2e^{(1/2)(\pi-4)}$; (b) $3 - \ln 4$; (c) $\frac{1}{e}$ (d) 11 31. $y = \frac{e}{x^3} e^{-1/x}$ 32. $f(x) = e^{x+1}$
33. 0 34. $f(x) = 3 + 2e^{2x}$; $g(x) = 3 - 2e^{2x}$.

Answer Ex-V**JEE PROBLEMS**

1. (a) $\frac{1}{8} \left[\frac{5\pi}{4} - \frac{1}{3} \right]$, (b) $I = \begin{cases} \frac{\pi\alpha}{\sin \alpha} & \text{if } \alpha \in (0, \pi) \\ \frac{\pi}{\sin \alpha} (\alpha - 2\pi) & \text{if } \alpha \in (\pi, 2\pi) \end{cases}$ 2. (a) A, (b) C, (c) A
3. (a) B, (b) A, (c) 2π , (d) $\frac{4\pi}{\sqrt{3}} \tan^{-1} \left(\frac{1}{2} \right)$ 4. (a) C, (b) C (c) $\frac{24}{5} \left(e \cos \left(\frac{1}{2} \right) + \frac{e}{2} \sin \left(\frac{1}{2} \right) - 1 \right)$
5. (a) C, (b) D, (c) A 6. 5051 7. (a) A; (b) (A)–S; (B)–S; (C)–P; (D)–R
8. A, D 9. (a) C; (b) A, B, C; (c) 0
10. (a) B, (b) A, (c) B, (d) 4