ISC CLASS XII MATHEMATICS (TEST PAPER 3) - SET 03

Time Allowed: 3 hours **Maximum Marks: 80**

Solutions to Question 1

1. $\boxed{\frac{5\pi}{6}}$
2. $\boxed{[1, 2]}$
3. $\boxed{\frac{dy}{dx} = -\frac{x}{y}}$
4. $\boxed{\frac{dy}{dx} = e^{\tan x} \cdot \sec^2 x}$
5. $\boxed{1}$
6. $\boxed{\cos x}$
7. $\boxed{0.7}$
8. $\boxed{\frac{1}{5}}$
9. $\boxed{(1, \frac{5}{3}) \text{ and } (-1, \frac{1}{3})}$
10. $\boxed{\begin{pmatrix} -8 & 0 \\ 0 & -8 \end{pmatrix}}$ (Correction: The result is the zero matrix, but the question seems to have an error.)

Solutions to Question 2

1. $\boxed{\text{Verified}}$
2. $\boxed{7.0357}$
3. $\boxed{1.5}$

Solutions to Question 3

1. $\boxed{\text{Verified}}$
2. $\boxed{x^2 + y^2 = Cx}$
3. $\boxed{\frac{2}{9}\ln|x-1| - \frac{1}{3(x-1)} - \frac{2}{9}\ln|x+2| + C}$
4. $\boxed{\text{Verified}}$ (The determinant is $(a+b+c)(a-b)(b-c)(c-a)$)

Solutions to Question 4

1. $\boxed{\text{Rectangle: width} = \frac{60}{4+\pi}\ \text{m, height} = \frac{30}{4+\pi}\ \text{m}}$
2. $\boxed{\frac{1}{2\sqrt{2}}\ln(3+2\sqrt{2})}$
3. $\boxed{A^{-1} = \begin{pmatrix} 13 & 2 & -7 \\ -3 & -1 & 2 \\ -2 & 0 & 1 \end{pmatrix}}$

Solutions to Question 5

(a) $\boxed{f^{-1}(x) = \frac{x-3}{4}}$

(b) $\boxed{\frac{6}{52}}$

(c) $\boxed{\text{Verified}}$

Solutions to Section B

Solution to Question 6

1. $\boxed{x - y + 3z - 2 = 0}$

2. $\boxed{\frac{\sqrt{21}}{2} \text{ square units}}$

Solution to Question 7

1. $\boxed{\begin{array}{l}\text{Vector equation: } \vec{r} = (-2\hat{i} + 4\hat{j} - 5\hat{k}) + \lambda(3\hat{i} + 5\hat{j} + 6\hat{k}), \\ \text{Cartesian equation: } \dfrac{x+2}{3} = \dfrac{y-4}{5} = \dfrac{z+5}{6}, \\ \text{Distance from origin: } \dfrac{\sqrt{2894}}{\sqrt{70}} = \sqrt{\dfrac{1447}{35}} \text{ units}\end{array}}$

2. $\boxed{9 \text{ square units}}$ (Correction: The area is 9 square units, not $\frac{32}{3}$)

Solutions to Section C

Solution to Question 8

1. $\boxed{\begin{array}{l}\text{Profit function: } P(x) = -3x^3 + 13x + 1, \\ \text{Maximum profit at } x = \dfrac{\sqrt{13}}{3} \text{ units}\end{array}}$

Solution to Question 9

1. $\boxed{\text{Maximum profit} = \text{Rs. } 7500 \text{ at } x = 1500, y = 0}$

2. $\boxed{\begin{array}{l} b_{yx} = 1.8, \\ b_{xy} = 0.5455, \\ r = 0.9909 \end{array}}$