3. If $\begin{bmatrix} 1 & 2 & 1 \\ 2 & 3 & 1 \\ 3 & a & 1 \end{bmatrix}$ is non-singular matrix and $a \in A$, then the set A is:

(*a*) IR (*b*) $\{0\}$ (*c*) $\{4\}$ (*d*) $IR - \{4\}$

Sol. (d) $IR - \{4\}$

4. If $|A| = |kA|$, where A is a square matrix of order 2, then sum of all possible values of k is:

(*a*) 1 (*b*) –1 (*c*) 2 (*d*) 0

Sol. (d) 0

5. If $\frac{d}{dx}[f(x)] = ax + b$ and $f(0) = 0$, then $f(x)$ is equal to;

(*a*) $a + b$ (*b*) $\frac{ax^2}{2} + bx$ (*c*) $\frac{ax^2}{2} + bx + c$ (*d*) b

Sol. (b) $\frac{ax^2}{2} + bx$

6. Degree of the differential equation $\sin x + \cos\left(\frac{dy}{dx}\right) = y^2$ is:

(*a*) 2 (*b*) 1 (*c*) not defined (*d*) 0

Sol. (b) 1

7. The integrating factor of the differential equation $(1-y^2)\frac{dx}{dy} + yx = ay, (-1 < y < 1)$ is:

(*a*) $\frac{1}{y^2-1}$ (*b*) $\frac{1}{\sqrt{y^2-1}}$ (*c*) $\frac{1}{1-y^2}$ (*d*) $\frac{1}{\sqrt{1-y^2}}$

Sol. (d) $\frac{1}{\sqrt{1-y^2}}$

8. Unit vector along $\overrightarrow{PQ}$, where coordinates of P and Q respectively are (2, 1, –1) and (4, 4, –7) is:

(*a*) $2\hat{i} + 3\hat{j} - 6\hat{k}$ (*b*) $-2\hat{i} - 3\hat{j} + 6\hat{k}$ (*c*) $\frac{-2}{7}\hat{i} - \frac{3}{7}\hat{j} + \frac{6}{7}\hat{k}$ (*d*) $\frac{2}{7}\hat{i} + \frac{3}{7}\hat{j} - \frac{6}{7}\hat{k}$

Sol. (d) $\frac{2}{7}\hat{i} + \frac{3}{7}\hat{j} - \frac{6}{7}\hat{k}$

9. Position vector of the mid-point of line segment AB is $3\hat{i} + 2\hat{j} - 3\hat{k}$. If position vector of the point A is $2\hat{i} + 3\hat{j} - 4\hat{k}$, then position vector of the point B is:

(*a*) $\frac{5}{2}\hat{i} + \frac{5}{2}\hat{j} - \frac{7}{2}\hat{k}$ (*b*) $4\hat{i} + \hat{j} - 2\hat{k}$ (*c*) $5\hat{i} + 5\hat{j} - 7\hat{k}$ (*d*) $\frac{\hat{i}}{2} - \frac{\hat{j}}{2} + \frac{\hat{k}}{2}$