3. Let $A=\begin{bmatrix}\cos\alpha & -\sin\alpha\\ \sin\alpha & \cos\alpha\end{bmatrix}, (\alpha\in R)$ such that $A^{32}=\begin{bmatrix}0 & -1\\ 1 & 0\end{bmatrix}$. Then, a value of α is **(2019 Main, 8 April I)**

(a) $\frac{\pi}{32}$ (b) 0 (c) $\frac{\pi}{64}$ (d) $\frac{\pi}{16}$

9. If $A=\begin{bmatrix}\alpha & 0\\ 1 & 1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 0\\ 5 & 1\end{bmatrix}$, then value of α for which $A^2=B$, is **(2003, 1M)**

(a) 1 (b) -1
(c) 4 (d) no real values

10. If A and B are square matrices of equal degree, then which one is correct among the following? **(1995, 2M)**

(a) $A+B=B+A$
(b) $A+B=A-B$
(c) $A-B=B-A$
(d) $AB=BA$

4. Let $P=\begin{bmatrix}1 & 0 & 0\\ 3 & 1 & 0\\ 9 & 3 & 1\end{bmatrix}$ and $Q=[q_{ij}]$ be two 3×3 matrices such that $Q-P^5=I_3$. Then, $\frac{q_{21}+q_{31}}{q_{32}}$ is equal to **(2019 Main, 12 Jan I)**

(a) 10 (b) 135 (c) 9 (d) 15

35. Prove that for all values of θ

$$\begin{vmatrix}\sin\theta & \cos\theta & \sin 2\theta\\ \sin\left(\theta+\frac{2\pi}{3}\right) & \cos\left(\theta+\frac{2\pi}{3}\right) & \sin\left(2\theta+\frac{4\pi}{3}\right)\\ \sin\left(\theta-\frac{2\pi}{3}\right) & \cos\left(\theta-\frac{2\pi}{3}\right) & \sin\left(2\theta-\frac{4\pi}{3}\right)\end{vmatrix}=0$$

(2000, 3M)

27. For positive numbers x, y and z, the numerical value of the determinant $\begin{vmatrix} 1 & \log_x y & \log_x z \\ \log_y x & 1 & \log_y z \\ \log_z x & \log_z y & 1 \end{vmatrix}$ is...... . **(1993, 2M)**

28. The value of the determinant $\begin{vmatrix} 1 & a & a^2 - bc \\ 1 & b & b^2 - ca \\ 1 & c & c^2 - ab \end{vmatrix}$ is .... . **(1988, 2M)**

29. Given that $x = -9$ is a root of $\begin{vmatrix} x & 3 & 7 \\ 2 & x & 2 \\ 7 & 6 & x \end{vmatrix} = 0$, the other two roots are... and... . **(1983, 2M)**

30. The solution set of the equation $\begin{vmatrix} 1 & 4 & 20 \\ 1 & -2 & 5 \\ 1 & 2x & 5x^2 \end{vmatrix} = 0$ is.... . **(1981, 2M)**

31. Let $p\lambda^4 + q\lambda^3 + r\lambda^2 + s\lambda + t = \begin{vmatrix} \lambda^2 + 3\lambda & \lambda - 1 & \lambda + 3 \\ \lambda + 1 & -2\lambda & \lambda - 4 \\ \lambda - 3 & \lambda + 4 & 3\lambda \end{vmatrix}$

be an identity in λ, where p, q, r, s and t are constants. Then, the value of t is.... . **(1981, 2M)**