

Matrix-Jam questions

1. The eigenvalues of the matrix representing the following pair of linear equations **Jam IIT 2016**

$$x + iy = 0$$

$$ix + y = 0$$

- (a) $1+i, 1+i$
(b) $1-i, 1-i$
(c) $1, i$
(d) $1+i, 1-i$
2. The trace of 2×2 matrix is 4 and its determinant is 8 . If one of the eigenvalues is $2(1 + i)$, the other eigenvalue is **Jam IIT 2015**
- (a) $2(1 - i)$
(b) $2(1 + i)$
(c) $(1 + 2i)$
(d) $(1 - 2i)$

3. The inverse of the matrix $\begin{bmatrix} 0 & 1 & 1 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$ **Jam IIT 2013**

- (a) $M-I$
(b) $M^2 - I$
(c) $I - M^2$
(d) $I-M$
4. Given 2 matrices P and Q such that P is Hermitian and Q is skew Hermitian. Which is Hermitian **Jam IIT 2011**
- (a) PQ
(b) iPQ
(c) $P+iQ$
(d) $P+Q$

5. A matrix is given $M = \frac{1}{\sqrt{2}} \begin{bmatrix} i & 1 \\ 1 & i \end{bmatrix}$ The eigen values of M are **Jam IIT 2010**

- (a) real and positive

- (b) purely imaginary with modulus 1
- (c) complex with modulus 1
- (d) real and negative

6. Find the normalized eigen vector of the matrix $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ corresponding to positive eigen value. The normalized eigen vectors of the matrix $N = \begin{bmatrix} 0 & -i \\ i & 0 \end{bmatrix}$ are β_1 and β_2 with eigen values λ_1 and λ_2 respectively. If the eigen vector obtained earlier is expressed as $a = P\beta_1 + Q\beta_2$ find P and Q
Jam IIT 2009

7. The product PQ of any two real symmetric matrices P and Q is **Jam IIT 2008**

- (a) Symmetric for all P and Q
- (b) never symmetric
- (c) symmetric if $PQ = QP$
- (d) antymmetric for all P and Q

8. Consider $\begin{bmatrix} x & y \end{bmatrix} \begin{bmatrix} 5 & -7 \\ 7 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix}$ The above equation represents **Jam IIT 2007**

- (a) circle
- (b) ellipse
- (c) hyperbola
- (d) straight line

9. The symmetric part of $P = \begin{bmatrix} a \\ b \end{bmatrix} \begin{bmatrix} (a-2) & b \end{bmatrix}$ is **Jam IIT 2006**

- (a) $\begin{bmatrix} a^2 - 2 & ba - 1 \\ ba - 1 & b^2 - 2 \end{bmatrix}$
- (b) $\begin{bmatrix} -2a & b \\ b & b^2 \end{bmatrix}$
- (c) $\begin{bmatrix} a(a-1) & b(a-1) \\ b(a-1) & b^2 \end{bmatrix}$
- (d) $\begin{bmatrix} a(a-2) & b(a-1) \\ b(a-1) & b^2 \end{bmatrix}$

10. Which of the following is incorrect for the matrix $M = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ **Jam IIT 2005**

- (a) $M = M^{-1}$
- (b) It is nonorthogonal
- (c) It is its own transpose
- (d) It has eigen values ± 1