Answer any one   :-

1. Find the rank of the matrix $A = \begin{pmatrix} 1 & 0 & 3 \\ 4 & -1 & 5 \\ 2 & 0 & 6 \end{pmatrix}$.

2. Let $f: A \to B$ be a mapping and P, Q be non-empty subsets of A. Prove that
   $$f(P \cap Q) \subseteq f(P) \cap f(Q).$$

3. If a, b, c be positive real numbers such that the sum of any two is greater than third, prove that $abc \geq (a + b - c)(b + c - a)(c + a - b)$.

4. Prove that the eigenvalues of a real symmetric matrix are all real.

5. If z_1, z_2 be two complex numbers, prove that
   $$|z_1 + z_2|^2 + |z_1 - z_2|^2 = 2(|z_1|^2 + |z_2|^2).$$

6. State and prove Caley-Hamilton theorem.