NAME: SID:

Problem 1: Find the general solution of the recurrence $U_n = 3U_{n-1} + 4U_{n-2} + 3^n$. Show your work.

(i) Characteristic equation and its solution:

(ii) General solution of the homogeneous equation:

(iii) Find particular solution of the non-homogeneous equation:

(iv) General solution of the non-homogeneous equation:

Problem 2: (a) Give the Inclusion-Exclusion Principle for the cardinality of the union of four sets, A, B, C, D:

$$|A \cup B \cup C \cup D| \; =$$

(b) Compute $\phi(364)$, where $\phi(n)$ denotes the Euler totient function.

Problem 3: Give a complete statement of Master Theorem for solving divide-and-conquer recurrences.