

Show **ALL** work for credit; be neat; and use only **ONE** side of each page of paper.

1. Tell how many systems of distinct representatives the given sequence of sets has

A. $\{1, 4\}, \{2\}, \{2, 3\}, \{1, 2, 3\}$

B. $\{1, 2, 3, 4, 5\}, \{1, 2, 3, 4, 5\}$

C. $\{1, 2, 3\}, \{4, 5\}, \{6, 7\}$

2. Given $a_1 = 4$ and $a_n = a_{n-1} + 4n$ for $n \geq 2$. Prove by induction that $a_n = 4\binom{n+1}{2}$ for $n \geq 1$.

Hint: If the $\binom{n+1}{2}$ bothers you, then you can expand $\binom{n+1}{2}$ to a polynomial before starting the induction.