Name: ______________________

Pid: ______________________

1. Show that $\sum_{i=1}^{n}(i+1)2^i = n2^{n+1}$ for all positive integers n.

2. Let n be a positive integer and $A_1, \ldots, A_n$ be some sets. Let us define union of these sets as follows:

   1. $\cup_{i=1}^{1} A_i = A_1$,
   2. $\cup_{i=1}^{k+1} A_i = (\cup_{i=1}^{k} A_i) \cup A_{k+1}$.

   Show that $\cup_{i=1}^{n} [i] = [n]$.

3. (10 points) Let Ω be some set. Consider $A_1, \ldots, A_n \subseteq \Omega$. Show that $\cup_{i=1}^{n} A_i = \{x \in \Omega \ : \ \exists i \in [n] \ x \in A_i\}$.