Directions: You may work to solve these problems in groups, but all written work must be your own. **Show your work**; See "Guidelines and advice" on the course webpage for more information.

1. Let $A = \{1, 2, 3, 4, 5, 6, 7, 8\}$ and let $B = \{\{1\}, \{2, 3, 4\}, (5, 6), 7\}$.
   (a) Determine $|A|$ and $|B|$.
   (b) Determine $A \cap B$.
   (c) True or False: $\{4, 3, 2\} \in A$
   (d) True or False: $\{4, 3, 2\} \in B$
   (e) True or False: $(6, 5) \in A$
   (f) True or False: $(6, 5) \in B$

2. Let $[n] = \{1, 2, 3, \ldots, n\}$. Describe a way to pair the subsets of $[n]$ of size k with the subsets of size $n - k$. What can you conclude about $\binom{n}{k}$ and $\binom{n}{n-k}$? Hint: if you find this question confusing, generate data for small cases. With $n = 5$ and $k = 2$, list the subsets of $\{1, 2, 3, 4, 5\}$ of size 2 in one column and size $n - k$ or 3 in a second column. Try to find a natural way to pair them up. If it still unclear, generate more data. When ready, generalize.