1. What is the total sum of values in row $n$ in Pascal’s triangle? Why is it this expression?

2. Let $X = \{a, b, c, d, e\}$.
   (a) Is $\{\{a, c, d\} , \{b, c, e\}\}$ a partition of $X$? Explain your answer.
   (b) Is $\{\{a, b, c\} , \{d, e\}\}$ a partition of $X$? Explain your answer.

3. Suppose you were given a partition $\{A, B, C\}$ of a set $X$. Explain how you can create a 4 subset partition of set $X \cup \{f\}$ (assume $f \not\in X$).

4. Suppose you were given a partition $\{A, B, C, D\}$ of a set $X$. Explain how you can create a 4 subset partition of set $X \cup \{f\}$ (assume $f \notin X$).

5. Use the previous two problems to explain the recurrence equation

$$\binom{|X| + 1}{4} = 4 \binom{|X|}{4} + \binom{|X|}{3}$$

where $\binom{n}{k}$ is the number of partitions of an $n$-element set into $k$ subsets.