1. (2 pts) There are six different candidates for governor of a state. In how many different orders can the names of the candidates be printed on a ballot?

2. (8 pts) How many bit strings of length 12 contain
   (a) exactly three 1’s?
   (b) at most three 1’s?
   (c) at least three 1’s?
   (d) an equal number of 0’s and 1’s?

3. (2 pts) How many ways are there for ten women and six men to stand in a line so that no two men stand next to each other? [Hint: First position the women, then the men.]

4. (6 pts) Thirteen people on a softball team show up for a game.
   (a) How many ways are there to choose 10 players to take the field?
   (b) How many ways are there to assign the 10 positions by selecting players from the 13 players who show up?
   (c) Of the 13 people who show up, three are women. How many ways are there to choose 10 players to take the field if at least one of these players must be a woman?

5. (2 pts) What is the coefficient of \(x^7\) in \((1 + x)^{11}\)?

6. (2 pts) The row of Pascal’s triangle containing the binomial coefficients \(\binom{10}{k}\), \(0 \leq k \leq 10\) is:
   1 10 45 120 210 252 210 120 45 10 1
   Use Pascal’s identity to produce the row immediately following this row in Pascal’s triangle.

7. (3 pts) Suppose that \(k\) and \(n\) are integers with \(1 \leq k < n\). Prove the identity
   \[
   \binom{n - 1}{k - 1} \binom{n}{k + 1} \binom{n + 1}{k} = \binom{n - 1}{k - 1} \binom{n}{k} \binom{n + 1}{k + 1}
   \]