

Name: _____

Directions: Show all work. Unless otherwise directed, you may leave your answer in terms of factorials, falling factorials, and binomial/multinomial coefficients. Any sums or products should be as simple as possible.

1. **[2.5 points]** How many 3-element subsets of $\{a, b, c, d, e, f, g, h\}$ are there? Give an explicit numerical answer.
2. **[2.5 points]** A group of 50 people must be split into two teams of size 5 and five teams of size 8. How many ways can this be done?
3. **[2.5 points]** A random lattice path of length $2n$ is generated by starting from $(0, 0)$. At each step, we increase the x -component by 1 with probability $1/2$ and we increase the y -component by 1 with probability $1/2$. What is the probability the lattice path ends at (n, n) ?
4. **[2.5 points]** A standard deck of cards has one card for each of the suit/rank pairs. The suits are spades, hearts, diamonds, and clubs; the ranks are ace, 2 through 10, jack, queen, and king. What is the probability that a poker hand (i.e. a set of 5 cards) has at most 2 cards in each suit?