Name: _____

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

1. **[1 point]** How many ways can a list of 4 distinct integers be formed from $\{1, \ldots, 10\}$ if the first two integers must sum to 8?

2. **[2 parts, 3 points each]** A class of 9 students needs to be split into 3 groups of 3 students.

   (a) How many ways can this be done, with no additional restrictions?

   (b) Suppose that two particular students, say students 8 and 9, do not get along and cannot be assigned to the same group. Now how many ways are there to assign the students to groups?

3. **[3 points]** A standard deck of cards has 4 suits (spades, hearts, diamonds, and clubs), and 13 ranks (ace, 2 through 10, jack, queen, and king), and contains one card for each suit/rank pair. Suppose that all 52 cards are ordered randomly. What are the odds that every spade appears before every heart?