1. Consider a collection of 6 bears. There is a pair of red bears consisting of one father bear and one mother bear. There is a similar green bear pair, and a similar blue bear pair. A bear pair is happy if it is sitting together. Let \( X \) denote the number of happy bear pairs. Find \( \mathbb{E}(X) \). (See Problem Set #7, question 4.)

2a. Pick two cards simultaneously at random from a well-shuffled deck of 52 cards. There are 36 cards which have numbers on them (cards 2 through 10, in each of the 4 suits), and there are 16 cards without numbers on them (A, J, Q, K, in each of the 4 suits). Let \( X \) be the number of cards that you get with numbers on them. Find \( \mathbb{E}(X) \). (See Problem Set #7, question 3.)

2b. Reconsider question 2a, but this time pick 3 cards. Find \( p_X(x) \) for \( 0 \leq x \leq 3 \), and \( \mathbb{E}(X) \).

3a. Consider a deck of 5 cards with the values A, 2, 3, 4, 5. We deal one card at a time from this deck of 5 cards, with replacement of the card back into the deck—and also shuffling—in between each deal. We continue in this fashion until the first A appears, and then we stop afterwards. Let \( X \) be the number of cards dealt. Find \( \mathbb{E}(X) \).

3b. Reconsider question 3a, but this time do not replace the cards after they are dealt. Find \( p_X(x) \) for \( 1 \leq x \leq 5 \), and \( \mathbb{E}(X) \).

4. Suppose Alice rolls a 6-sided die, and Bob rolls a 4-sided die. Let \( X \) denote the maximum value on the two dice.

4a. Find \( p_X(x) \) for \( 1 \leq x \leq 6 \).

4b. Find \( \mathbb{E}(X) \).