Please write Your name:

Show all work. You should either write at a sentence explaining your reasoning, or annotate your math work with brief explanations. There is no need to simplify, and no calculators are needed.

(1) Four balls are randomly withdrawn without replacement from a bowl containing 5 white and 3 black balls. What is the probability that two balls are white and the other two are black?

Answer: \[ \frac{\binom{5}{2} \cdot \binom{3}{2}}{\binom{8}{4}} = \frac{30}{70} = \frac{3}{7} \]

(2) Four balls are randomly withdrawn with replacement from a bowl containing 5 white and 3 black balls. What is the probability that two balls are white and the other two are black?

Answer: \[ \binom{4}{2} \cdot \left(\frac{5}{8}\right)^2 \cdot \left(\frac{3}{8}\right)^2 \]

(3) Suppose you roll two dice, E is that the sum is 3, F that the first is a 2. Are E and F independent?

Answer: Not independent because \( \Pr(E) = 2/36, \Pr(F) = 1/6, \Pr(E \cap F) = 1/36. \)

(4) Suppose you toss a fair coin repeatedly and independently. If it comes up heads, you win a dollar, and if it comes up tails, you lose a dollar. Suppose you start with $2. What is the probability that you will get up to $4 before you go down to $1?

Answer: \( \Pr = 1/3 \) which will be explained in class.

(End of the quiz)