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(1) Four balls are randomly withdrawn without replacement from a bowl containing 5 white and 3 black balls.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: $\dfrac{\binom{5}{2}\cdot\binom{3}{2}}{\binom{8}{4}} = \frac{30}{70} = \frac{3}{7}$

(2) Four balls are randomly withdrawn with replacement from a bowl containing 5 white and 3 black balls.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 $\mathbb{P}(E) = 2/36$, $\mathbb{P}(F) = 1/6$, $\mathbb{P}(E \cap F) = 1/36$.

(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: $\mathbb{P} = 1/3$ which will be explained in class.

(End of the quiz)