***Please write* *Your name:*** _____

You may leave your answer in terms of sums, products, factorials or binomial coefficients, and fractions. There is NO need to simplify. NO calculators are needed.

(1) Suppose a box has 3 red marbles and 2 black ones. We select 2 marbles. What is the probability that second marble is red given that the first one is red?

***Answer:*** $\frac{1}{2}$

(2) Suppose that 36% of families own a dog, 30% of families own a cat, and 22% of the families that have a dog also have a cat. What is the probability that a family is chosen at random has a dog and a cat?

***Answer:*** $\frac{36 \cdot 22}{100^2} = \frac{99}{1250}$

(3) In the same situations, a family is chosen at random and found to have a cat. What is the probability they also own a dog?

***Answer:*** $\frac{\frac{99}{1250}}{\frac{30}{100}} = \frac{33}{125}$

(4) An urn has 5 blue balls and 8 red balls. Each ball that is selected is returned to the urn along with an additional ball of the same color. Suppose that 3 balls are drawn in this way. What is the probability that the three balls are blue?

***Answer:*** $\frac{5}{13} \cdot \frac{6}{14} \cdot \frac{7}{15} = \frac{1}{13}$

(5) Suppose that 60% of UConn students will be at randomly exposed to the flu. If you are exposed and did not get a flu shot, then the probability that you will get the flu (after being exposed) is 80%. If you did get a flu shot, then the probability that you will get the flu (after being exposed) is only 15%. What is the conditional probability that a person who got a flu shot will get the flu?

***Answer:*** $\frac{3}{5} \cdot \frac{15}{100} = \frac{9}{100}$

(6) In the same situation, what is the conditional probability that a person who did not get a flu shot will get the flu?

***Answer:*** $\frac{3}{5} \cdot \frac{80}{100} = \frac{12}{25}$