

STAT/MA 41600
More Practice Problems: October 6, 2014

1. Rock Block. On a certain radio station, 70% of the songs are rock songs, and 30% of the songs are pop songs. The songs are selected independently. Each “block” of songs (a “block” is a set of songs between commercials) contains 10 songs. The DJ says that the next “block” of songs has at least 8 rock songs. Given this information, what is the probability that *all 10 songs* in that “block” will be rock songs?

2. Pizza. A pizza place offers the choice of the following toppings: extra cheese, mushrooms, pepperoni, ham, sausage, onions, and green peppers. Assume that order of toppings is irrelevant. Also assume that toppings cannot be reused (e.g., no double sausage is allowed).

a. How many 3-topping pizzas are possible?

b. If I randomly order a 3-topping pizza, what is the probability that sausage is a topping?

c. If I randomly order a 3-topping pizza, what is the probability that sausage and pepperoni are toppings?

3. Couples in a Circle.

a. If Alice and Alan (a couple) and Barbara and Bob (another couple) sit in a circle of chairs, what is the probability that each of the couples sit together?

b. If Alice and Alan (a couple) and Barbara and Bob (another couple) and Christine and Charlie (another couple) sit in a circle of chairs, what is the probability that each of the 3 couples sit together?

c. If n couples sit in a circle of chairs, what is the probability that each of the n couples sits together?

4. Bears. A little girl randomly arranges 30 bears—consisting of 10 red bears, 10 yellow bears, and 10 blue bears—into 10 bowls of 3 bears each. (All outcomes are equally likely.)

Let X denote the number of bowls that have at least one blue bear in the bowl. (The little girl loves blue bears.) Find the expected value of X .

5. More Bears! A total of 30 bears—consisting of 10 red bears, 10 yellow bears, and 10 blue bears—are randomly arranged in a bucket. A child begins grabbing the bears at random, with all selections equally likely. The bears are selected “without replacement”, i.e., she never puts the bears back after she grabs them.

How many bears does the child expect to grab *before* the first red bear appears? (Please do not include the red bear itself; only include the bears that appear strictly before the first red bear appears.)