1. Determine whether or not the given procedure results in a binomial, poisson, or hypergeometric distribution.
   1. The flaws in a piece of timber occur at the rate of 0.07 per linear foot. The random variable X is the number of flaws in the next 20 linear feet of timber.
   2. According to the American Lung Association, 90% of adult smokers started smoking before turning 21 years old. Ten smokers 21 years old or older are randomly selected, and the number of smokers who started smoking before 21 is recorded.
   3. According to the 2005 American Community Survey, 43% of women aged 18 to 24 were enrolled in college in 2005. Twenty –five women aged 18 to 24 are randomly selected, the number enrolled in college is recorded.
   4. A Maryland company needed to downsize one department having 30 people – 12 women and 18 men. Ten people were laid off, and upper management said the layoff’s were done randomly. The random variable X represents the number of women in the 10 laid off.
   5. A corporation has 11 manufacturing plants. Of these, 7 are domestic and 4 are located outside the US. Each year a performance evaluation is conducted for 4 randomly selected plants.
   6. The number of cars that arrive at a bank’s drive-through window between 3:00pm and 6:00pm arrive at a rate of 0.41 cars every minute. The random variable X is the number of cars that arrive between 4:00pm and 4:10.
2. Officer Thompson of the Bay Ridge Police Department works the graveyard shift. He averages 4.5 calls per shift from his dispatcher. Assume the number of calls follows a Poisson distribution.
   1. What is the probability that Officer Thompson gets fewer than 2 calls in a shift?
   2. What is the probability that Officer Thompson gets at least one call in a shift?
   3. What is the mean a standard deviation for the number of calls he gets in a shift?
3. The Food and Drug Administration sets a Food Defect Action Level (FDAL) for the various foreign substances that inevitably end up in the food we eat and liquids we drink. For example, the FDAL level for insect filth in peanut butter is 0.3 insect fragments (larvae, eggs, body parts, and so on – doesn’t this just make you crave a PB&J?) per grams. Suppose that a supply of peanut butters contains 0.3 insect fragments per gram. Compute the probability that the number of insect fragments in a 5-gram sample of the peanut butter is (Hint: if there is on average 0.3 in a gram and it is the same for each gram you would expect on average 1.5 in 5 grams)
   1. Exactly two.
   2. Fewer than two
   3. At least two
   4. At least one

4. A student takes a multiple-choice exam with 10 questions, each with four possible selections for the answer. A passing grade is 60% or better. Suppose that the student was unable to find time to study for the exam and just guesses at each question. Find the probability that the student

1. Demonstrate that this is a binomial experiment.
2. Gets at least one question correct.
3. Passes the exam
4. Receives an A on the exam (90% or better)
5. How many questions would you expect the student to get correct?
6. Obtain the standard deviation of the number of questions that the student gets correct.