Worksheet: Sampling Distributions

1. It is generally believed that near sightedness affects about 12% of all children. A school district has registered 170 incoming kindergarten children.

a) Can you approximate a normal model?

b) How many of the incoming students might the school expect to be near sighted?

c) What is the probability that 15% or more children in the class are affected by near sightedness?

2. Based on past experience, a bank believes that 7% of the people who receive loans will not make payments on time. The bank has recently approved 200 loans.

a) What are the mean and standard deviation of the proportion of clients in this group who may not make timely payments?

b) What’s the probability that over 10% of these clients will not make the payment?

3. A college’s data about the incoming freshman indicates that the mean of their high school GPA’s was 3.4, with a standard deviation of 0.35. The students are randomly assigned to freshman writing seminars in groups of 25. Assume that GPA of the students follow normal distribution.

a) What might be the mean GPA of one of these seminar groups?

b) What is the standard deviation of the mean GPA of the group?

c) What is the probability that the Mean GPA of the group is less than 3?

d) If you select one student randomly from the group, what is the probability that his/her GPA is more than 3.5?
4. Assume that the duration of human pregnancies can be described as a normal model with mean 266 days and standard deviation 16 days.

a) What percentage of pregnancies should last between 279 and 280 days?

b) At least how many days should the longest 25% of all pregnancies last? (hint: find the 3rd quartile)

c) Suppose a certain obstetrician is currently providing prenatal care to 60 pregnant women. Let y (bar) represent the mean length of their pregnancies. According to CLT what is the distribution of the sample mean? Specify the mean and standard deviation?

f) What’s the probability that the mean duration of these patients’ pregnancies will be less than 260 days?

5. Carbon monoxide (CO) emissions for a certain kind of car vary with mean 2.9g/mi and standard deviation 0.4 g/mi. A company has 80 of these cars in its fleet. Let y (bar) represent the mean CO level for the company’s fleet.

a) What’s the approximate model for the distribution of y (bar)?

b) Estimate the probability that y (bar) is between 3.0 and 3.1 g/mi?

c) There is only 5% chance that the fleet’s mean CO level is greater than what value?

6. The weight of potato chips in a medium sized bag is stated to be 10 ounces. The amount that the packaging machine puts in these bags is believed to have a normal model with mean 10.2 ounces and a standard deviation 0.12 ounces.

a) What percentage of all bags sold are underweight?

b) Some of the chips are sold in “bargain packs” of 3 bags. What’s the probability that none of the 3 is underweight?
c) What’s the probability that the mean weight of the 3 bags is below the stated amount?

d) What’s the probability that the mean weight of a 24 bag case of potato chips is below 10 ounces?

7. The candy company claims that 10% of the M&M’s it produces are green. Suppose that the candies are packaged at random in small bags containing about 50 M&M’s. A class of elementary school students learning about percent open several bags, counts the various colors of the candies and calculates the proportion that are green.

a) What should be the mean and standard deviation of the proportion of green M&M?

Suppose the class buys bigger bags of candy, with 200 M&M’s each.

b) What should be the mean and standard deviation of the proportion of green M&M now?

c) What is the probability that 30 green M&M are found in a bag?

d) What is the probability that one finds less than 10 green M&M in a bag?

e) What is the chance of getting more than 10 but less than 25 green M&M in a bag?