Unit 5

Sampling Distributions

Addendum

For question #1

(o) Suppose that the overall success rate is 60%. If a random sample of size 250 is selected, describe the sampling distribution of the sample proportion of successful treatments.

(p) What are the assumptions that are required in order for the distribution in part (o) to correct?

(q) Using the information from part (o), what is the probability of the sample proportion of successful treatments exceeding 65%?

For question #5

(h) Using the information from part (d), what is the probability that four randomly chosen bottles will have a mean amount that is 0.615 liters or more?

(i) Describe the sampling distribution of the sample mean from part (h).

(j) What are the assumptions that are required in order for the distribution in part (i) to correct?

(k) What if 30 bottles were randomly selected? What is the probability of the bottles having a mean that is 0.615 liters or more?

(l) If the original data were skewed instead of normal, describe how this would change your answers to part (h) and (k).

Unit 5

Sampling Distributions

Addendum—Key

For question #1

(o) Suppose that the overall success rate is 60%. If a random sample of size 250 is selected, describe the sampling distribution of the sample proportion of successful treatments.

*The* $mean\left(\hat{p}\right)=0.60$*;* $sd\left(\hat{p}\right)=\sqrt{\frac{0.6\*0.4}{250}}=0.031$*; shape ≈ normal*

(p) What are the assumptions that are required in order for the distribution in part (o) to correct?

*random sample* *✔; 250 < 10% of patients, assumed; 250\*0.60 = 150 > 10 ✔; 250\*0.40 = 100 > 10 ✔*

(q) Using the information from part (o), what is the probability of the sample proportion of successful treatments exceeding 65%?

$P(\hat{p}>0.65)$*,* *using normal cdf with μ = 0.60 & σ = 0.031;* → 5.3%

For question #5

(h) Using the information from part (d), what is the probability that four randomly chosen bottles will have a mean amount that is 0.615 liters or more?

$P(\overbar{x}>0.615)$*, using normal cdf with μ = 0.60 & σ = 0.04/√4 = 0.02;* → 22.7%

(i) Describe the sampling distribution of the sample mean from part (h).

$mean\left(\overbar{x}\right)=0.60$*;* $sd\left(\overbar{x}\right)=^{0.04}/\_{\sqrt{4}}=0.02$*; shape ≈ normal*

(j) What are the assumptions that are required in order for the distribution in part (i) to correct?

*random sample ✔️; 4 < 10% of all bottles ✔️; population is stated to be normally distributed ✔️*

(k) What if 30 bottles were randomly selected? What is the probability of the bottles having a mean that is 0.615 liters or more?

$P(\overbar{x}>0.615)$*, using normal cdf with μ = 0.60 & σ = 0.04/√30 = 0.0073;* → 2.0%

(l) If the original data were skewed instead of normal, describe how this would change your answers to part (h) and (k).

*For part (h), the shape of the sampling distribution would be skewed, so we would be unable to find the requested probability. However, for part (k), the CLT would tell us that the shape of the sampling distribution is normal (30 is large), so the answer would not change.*