Chapter 9 Quiz 2013-14
Virmani/Congress [25]

Name: Key
Period:

1. The number of hours a light bulb burns before failing varies from bulb to bulb with a mean $\mu = 200$ hours and a standard deviation $\sigma = 12.3$. The population distribution is skewed right. [7]

If an SRS of **5 bulbs** were selected, then ?

a. Describe the shape of the sampling distribution:

It would still be skewed right, although less so.

b. Find the sample distribution mean:

$\mu_{\bar{x}} = 200$

c. Find the sample distribution standard deviation:

$\sigma_{\bar{x}} = \frac{12.3}{\sqrt{5}} \approx 5.50$

If an SRS of **40 bulbs** were selected, then

d. Describe the shape of the distribution:

Approximately Normally distributed

e. Find the sample distribution mean:

$\mu_{\bar{x}} = 200$

f. Find the sample distribution standard deviation:

$\sigma_{\bar{x}} = \frac{12.3}{\sqrt{40}} \approx 1.94$

2. A certain beverage company is suspected of under-filling its cans of soft drink. The company advertises that its cans contain, on average, 12 ounces of soda with standard deviation of 0.4 ounce. Assume that the company is telling the truth.

a. A quality control inspector measures the contents of an SRS of 50 cans of the company's soda and calculates the sample mean $\bar{x}$. What are the mean and standard deviation of the sampling distribution of $\bar{x}$ for sample size n = 50?

[3]

$\mu_{\bar{x}} = 12$ oz

$\sigma_{\bar{x}} = \frac{0.4}{\sqrt{50}} \approx 0.057$ oz

$n \geq 30$ so approx. Normal by CLT

b. The inspector in part (a) obtains a sample mean of $\bar{x} = 11.9$ ounces. Calculate the probability that a random sample of 50 cans produces a sample mean fill of 11.9 ounces or less. [5]

$P(\bar{x} \leq 11.9) = \text{ncdf}(-\infty, 11.9, 12, \frac{0.4}{\sqrt{50}}) = 0.0385$

- SRS
- $N \geq 5000$ cans

[3]

c. What would you conclude about whether the company is under filling its cans of soda? Justify your answer.

The prob. of getting a sample mean of 11.9 by chance is only 3.85%. This indicates that most likely the cans are being underfilled.

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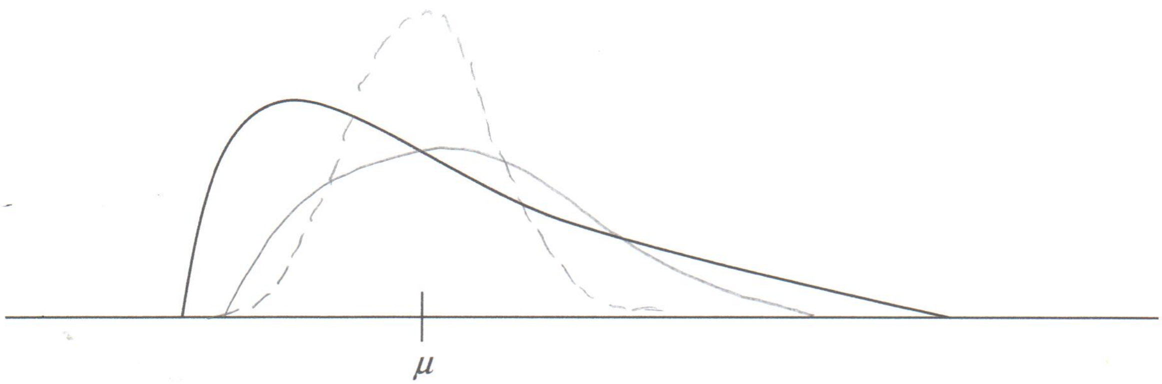
3. Explain the Central Limit Theorem in your own words with regards to shape.

Regardless of the population shape, as you increase the sample size (n), the Sampling Distribution appears more and more Normaly distributed.

4. The graph below shows the population distribution of test scores (x) on a difficult exam and the population mean exam score (μ). Put the following two graphs on the axis below:

a. Use a solid line to draw an estimate of the graph of the sampling distribution of $\bar{x}$ for n = 4 [2]

b. Use a dotted line to draw an estimate of the graph of the sampling distribution of $\bar{x}$ for n = 50. [2]



$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$ so spread decreases

1X