

Station 1: Normal Distribution

1.

The mean cholesterol level in children is 175 mg/dl with standard deviation 35 mg/dl. Assume this level varies from child to child according to an approximate normal distribution. What percentage of children have a cholesterol level above 200 mg/dl?

$$\text{normalcdf}(200, E99; 175, 35)$$

23.8%

2.

The length of the elephant pregnancies from conception to birth varies according to a distribution that is approximately normal with mean 525 days and standard deviation 32 days. What percent of pregnancies last between 510 and 540 days (that's between 17 and 18 months)?

$$\text{normalcdf}(510, 540, 525, 32)$$

36.1%

3.

A manufacturer of bulbs for movie projectors advertises a life of 50 hours. A study of these bulbs indicates that their lives are normally distributed with a mean of 61 hours and a standard deviation of 6.3 hours. What is the percentage of bulbs that fail to last as long as the manufacturer claims?

4.0%

4.

GPA's of freshman biology majors at a certain university have approximately the normal distribution with the mean 2.87 and the standard deviation is 0.34. Students are thrown out of school if their GPA falls below 2.00. What proportion of all freshman biology majors are thrown out?

.5%

Station 2: Measures of Central Tendency

Annual Income	Number of Employees
\$105,000	1
60,000 X 3	3
30,000	1
28,000 X 5	5
21,000 X 10	10

$n = 20$

1. Find the mean, median, mode, and range.

$\bar{X} = \$33,250$ $ME = \$24,500$

mode \$21,000
range \$84,000

2. In negotiations, the owner of the company will probably use the mean to describe the company. Why?

It's the average that displays the most money from the company

3. The union leader (person negotiating for the workers) will probably use the mode to describe the company. Why?

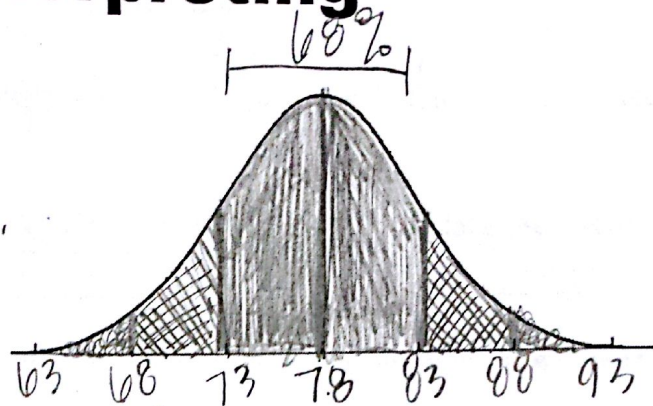
It's the average that displays the least amount of money from the company

4. A statistician would probably use the median to describe the company. Why?

The average excludes outliers

Station 3: Interpreting

1. 2000 sophomores at UNC Charlotte took a physics test. The scores were distributed normally with a mean of 78 and standard deviation of 5. Label the following curve and answer corresponding questions.



- a.) What percentage of scores are between 73 and 83? 68%
- b.) What percentage of scores are less than 68? 2.5%
- c.) What percentage of scores are between 70 and 77? 36.6% normalcdf(70,77,78,5)
- d.) What percentage of scores are greater than 82? 21.2%
- e.) Approximately how many physics students scored between 78 and 84? 39.5%
- f.) Approximately how many physics students scored less than 67? 1.39%

Station 4: Z - Scores $z = \frac{x - \bar{x}}{s_x}$

1. a.) On a Statistics test, the class mean was 63 and the standard deviation was 7. Calculate the z-score if you got a 72 on the test.

$$\frac{72 - 63}{7} = 1.286$$

b.) For the Biology test, the mean was 68 and the standard deviation was 10. Calculate the z-score if you got a 72 on the test.

$$\frac{72 - 68}{10} = .4$$

c.) For the English test, the mean was 76 and the standard deviation was 8.5. Calculate the z-score if you got a 72 on the test.

$$\frac{72 - 76}{8.5} = -.471$$

2. Compare the results between the 3 tests in Question 1.

higher the mean, lower the z-score

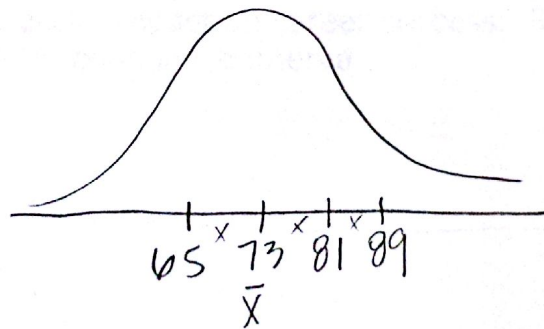
3. Describe in words what a z-score actually means.

represents how many standard deviations away a value is from the mean

4. The scores on a recent test are normally distributed. John's test score of 65 was 1 standard deviation below the mean. Kristin's test score of 89 was 2 standard deviations above the mean. What are the mean and standard deviation for the test score distribution?

$$\bar{x} = 73$$

$$s_x = 8$$



$$\frac{89 - 65}{24}$$

$$\frac{24}{3} = 8$$

$$s_x = 8$$

Station 5: Margin of Error & Confidence Intervals

$$\bar{x} = 71.42$$

$$s_x = 3.18$$

List: use
 $ME = 1.96 \frac{s_x}{\sqrt{n}}$

1. The students in Ms. Smith's class have obtained the following scores on the state test:

71 70 69 76 68 73 76 72 68 76 68 70

$n = 12$

$ME = 1.8$

What is the 95% confidence interval for the data?

$$71.42 \pm 1.8 \quad [69.62, 73.22]$$

2. In a survey of 2500 high school students, 1952 said they had to purchase some of their own clothes from their allowance. What is the margin of error?

part of whole: use $SE = 1.96 \sqrt{\frac{p(1-p)}{n}} = 1.96 \sqrt{\frac{.7608(1-.7608)}{2500}} = .016$

3. SENIOR CITIZENS In a survey of U.S. citizens aged 65 and over, an average of 52% said that they participated in activities at their local Senior Citizen Center at least twice a year. The margin of error was 5%.

What does the 5% indicate about the results?

The population mean (μ) will be [47%, 57%]

4. In an international survey with 4,561 respondents, 46% said that 'coaching or mentoring' has a great impact on career success. Find the margin of error of the survey and the 95% confidence interval.

part of whole

$$4,561 \times .46 = 2098.06$$

whole part

$$\frac{2098.06}{4,561} = .46!$$

yay \hat{p}

don't believe me? Here's how to check

Solution...

$$1.96 \sqrt{\frac{.46(1-.46)}{4,561}} = .014$$

$$.46 \pm .014$$

$$[.446, .474] \text{ OR}$$

$$[44.6\%, 47.4\%]$$

Station 6: Sampling and Randomization

1. A politician wants to know what issues are most important to the voters in his district. Identify the sampling method and state any bias in the method.

Convenience sample	Self-selected sample	Systematic sample
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a. The politician spends 9:00 am to 4:00 pm on Tuesday talking to people as they enter a grocery store.

Convenience sample

b. The politician sets up a questionnaire on his website.

Self-selected sample (same idea as volunteer)

c. The politician uses the phone book and selects every 50th citizen to call.

Systematic sample

2. State whether each method would produce a random sample. Explain your reasoning.

a. surveying people coming out of a movie theater to find out people's favorite entertainment

no because you could choose the movie

b. placing a survey in the local newspaper to determine how people voted in the last election

no because only get answers from volunteers

c. selecting students at a school to answer questions by randomly drawing their student identification numbers from a hat

yes because you drawing numbers blindly

only use random when drawing names or numbers