**LAB 3: PROBABILITY, Z-SCORES, AND Z-TESTS**

PART A: Calculating the Standard Deviation

1. Let’s imagine you had a bigger sample. You can use Excel to help you calculate the answers, but then report your table of work here showing how you calculated the Sum of Squares and then the Standard Deviation. The values in your sample are in a dataset called “Psych Department Ratings from Students”

|  |
| --- |
| **x** |
| 2 |
| 5 |
| 9 |
| 7 |
| 10 |
| 6 |
| 4 |
| 10 |
| 8 |
| 7 |
| 8 |
| 3 |
| 5 |
| 9 |
| 8 |
| 7 |
| 9 |
| 8 |
| 6 |
| 9 |

**PART B: BASIC PROBABILITY, FORMULAS, AND PERCENTAGES**

1. A candy comes in five colors: red, blue, brown, green, and yellow. I have 500 candies with an equal number of each color.
   1. In one pick, what is the probability of my selecting a red candy? \_\_\_\_\_\_1/5\_\_\_\_\_\_\_\_
   2. What is the probability of my selecting red or green candy? \_\_\_\_\_2/5\_\_\_\_\_\_\_
   3. What is the probability of selecting a red candy, eating it, and then selecting a blue one? \_\_\_\_4.008%\_\_\_\_\_\_\_

1/5\*100/499

1. What is the formula to calculate the standardized value (z-score) of a datapoint to see where it falls relative to other values in your dataset?

Z-Score = (X – Mean) / Stamdard Deviation

3. You want to standardize a score of 77 on an exam that had a mean of 80 and a standard deviation of 2. Below write the formula and substitute in the values that you would need to use to solve this problem.

Z-Score = (X – Mean) / Stamdard Deviation

z-score = (77-80) / 2

z-score = -3 / 2

z-score = -1.5

4. Convert:

a. 89.20% into a value expressed in decimals: \_\_\_\_0.8920\_\_\_\_\_\_\_\_\_\_\_\_

b. .6634 into a value expressed as a percent: \_\_\_\_66.34%\_\_\_\_\_\_\_\_

c. 1/5 into a value expressed in decimals:\_\_\_\_\_\_0.2\_\_\_\_\_\_\_\_\_ and as a percent: \_\_\_\_\_\_\_\_20%\_\_\_\_\_\_

5. If I eat 68.2% of a birthday cake, how much is left?

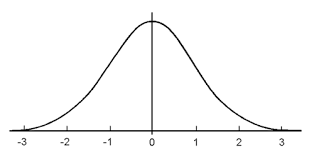
31.8% of the cake

6. There’s a party going on 779 yards away from where Jamal and Pilar are standing. Jamal runs 628 yards before stopping. Pilar runs 356 yards before stopping. How many yards apart are Jamal and Pilar now?

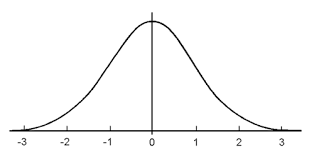
Jamal ran 272 yards further than Pilar.

**PART C: PROBABILITY/PERCENTAGES AND Z-SCORES**

**For each question, you can copy and paste this normal curve image and mark it up on Paint or PowerPoint to create a visual representation of what you are doing.**



1. Imagine I recorded the distances of every hiking trail in the United States and this data yielded in a population with a standard normal distribution whose mean was 20 miles and standard deviation was 4 miles. Indicate below the appropriate distances for trails at each z-score (-3 to +3).



|  |  |
| --- | --- |
| Z score | Distance |
| -3 | 8 |
| -2 | 12 |
| -1 | 16 |
| 0 | 20 |
| 1 | 24 |
| 2 | 28 |
| 3 | 32 |

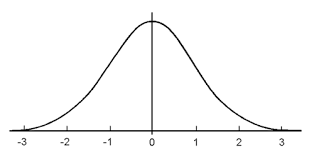
1. The mean revenue taken in by mid-size companies is normally distributed with a **mean** of $5 million and a **standard deviation** of $500,000. *For each question you must plot the location of the scores, shade the area that is of interest, and note the information requested.*
   1. Approximately 95% of companies’ revenues are between \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1-.95= 0.05

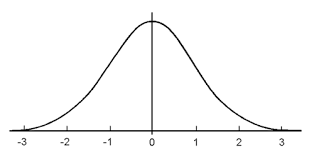
.05/2 = 0.025

Zscores are -1.95996 and 1.95996

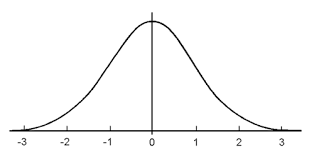
5M+/-979980



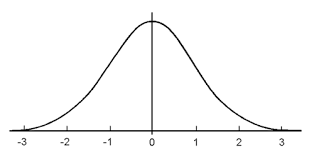
* 1. The top 10% of the companies have revenues that exceed \_\_\_\_\_\_\_\_\_\_\_\_.



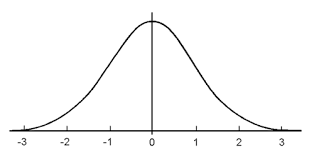
* 1. If I select a company at random, what is the probability that its revenues will be $5.7 million or more?



* 1. What proportion of the companies have revenues between $4.6 million and $6.1 million?



1. Below is a sample of reading scores from a population of 6th graders with a **mean of 75** and a **standard deviation of 5.**



* 1. Transform the individual scores to *z*-scores (show your work)

Student Score Z-score

A 56

B 65

C 68

D 73

E 77

F 83

G 96

* 1. Which students scored about the 75th percentile?

**PART D. SOME REVIEW**

1. A child recorded how many candies each household gave out on Halloween.

a) What is the best measure of central tendency to describe this data? Why?

b) Count the open-ended (7 or more) option as if it were exactly 7 candies. Calculate the mean and standard deviation:

|  |  |
| --- | --- |
| # of candies given out by a household | *f* |
| 0 | 8 |
| 1 | 15 |
| 2 | 7 |
| 3 | 6 |
| 4 | 4 |
| 5 | 2 |
| 6 | 1 |
| 7 or more | 4 |

c) Make a bar chart showing the frequency distribution of candies given out.

