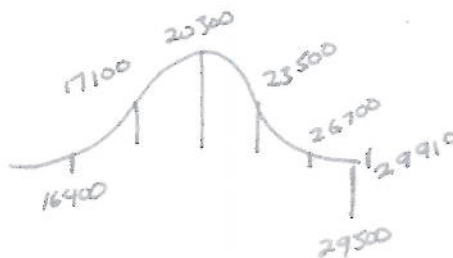


A company makes a mean monthly income of \$20,300 with a standard deviation of \$3,200. In one given month the company makes \$29,500.

- 1) Find the z-score.

$$z = \frac{29500 - 20300}{3200}$$

$$z = 2.875$$



- 2) Assuming the company's monthly income is normal, what percent of the time does the company make more than this amount? Less than?

more than \$29,500 $1 - .9980 = .0020$ IF $z = 2.875$, $\rightarrow .9980$

less than \$29,500 $\rightarrow .9980$ (99.8%)

- 3) What percent of the time does the company make between \$15,000 and \$25,000?

$$z = \frac{25000 - 20300}{3200} = 1.469 \rightarrow .9292$$

$$.9292 - .0485 = .8807$$

or
88.07%

$$z = \frac{15000 - 20300}{3200} = -1.656 \rightarrow .0485$$

- 4) If the company needs to make \$16,400 in order to break even, how likely in a given month is the company to make a profit?

$$z = \frac{16400 - 20300}{3200} = -1.219 \rightarrow .1112$$

$$1 - .1112 = .8888 = 88.88\%$$

On the Wechsler Adult Intelligence Scale, an average IQ is 100 with a standard deviation of 15 units.
(Source: https://en.wikipedia.org/wiki/Intelligence_quotient)

- 5) IQ scores between 90 and 109 are considered average. Assuming IQ scores follow a normal distribution, what percent of people are considered average?

$$z = \frac{90 - 100}{15} = -0.667 \rightarrow .2514$$

$$.7257 - .2514 = .4743 = 47.43\%$$

$$z = \frac{109 - 100}{15} = .6 \rightarrow .7257$$

- 6) One measure of genius is an IQ score of above 135. What percent of people are considered genius?

$$z = \frac{135 - 100}{15} = 2.333 \rightarrow .9901$$

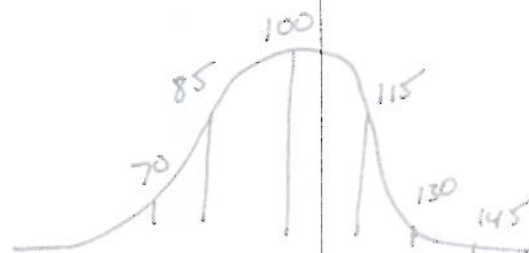
$$1 - .9901 = .0099 = .99\%$$

- 7) Einstein had an IQ score of 160. What is his z-score?

$$z = \frac{160 - 100}{15} = 4 \text{ off the chart!}$$

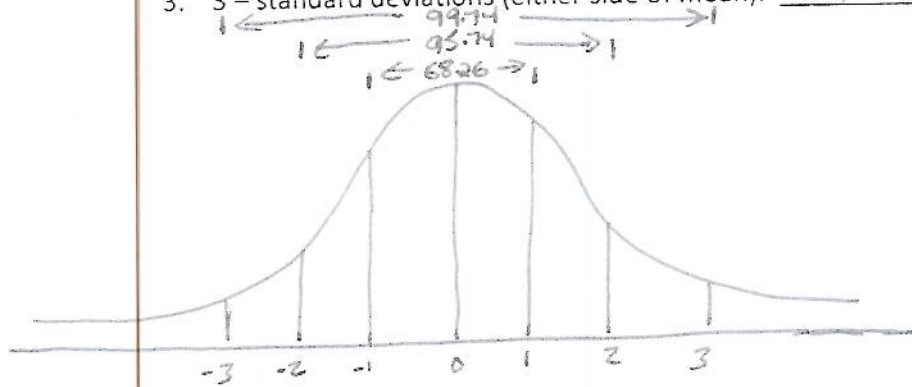
- 8) What is the probability of an individual having a higher IQ score than Einstein?

0%



1. Draw a diagram of a normal curve distribution to include the percentage breakdown of each standard deviation section. Identify the points of inflection on the normal curve. How much area is under the curve for

1. 1 - standard deviation (either side of mean): 68%
2. 2 - standard deviations (either side of mean): 95%
3. 3 - standard deviations (either side of mean): 99.75%



2. Describe characteristics of a normal curve (give a minimum of three characteristics).

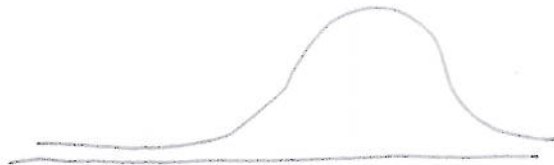
- Approximately Symmetric
- 1 peak or mode
- mound shaped
- bell shaped
- mean, median, mode are the same.

3. Draw a sketch for the following curves that do not have normal distributions:

- a. Skewed right:



- b. Skewed left:



- c. Trimodal:



- d. Uniform:



(Due Friday)

Name _____

Homework:

Calculate the MAD and find the Standard deviation for the following data sets:
(show work for MAD)

1) 8, 11, 15, 8, 12 $\bar{x} = 10.8$ $s_x = 2.95$

$$\frac{|8-10.8| + |11-10.8| + |15-10.8| + |8-10.8| + |12-10.8|}{5} = \frac{2.8 + .2 + 4.2 + 2.8 + 1.2}{5} = 2.2 \text{ MAD}$$

2) 1, 1, 1, 4, 3, 2, 2 $\bar{x} = 2.16$ $s_x = 1.17$

$$\frac{|1-2.16| + |1-2.16| + |1-2.16| + |4-2.16| + |3-2.16| + |2-2.16| + |2-2.16|}{6} = \frac{1.16 + 1.16 + 1.84 + .84 + .16 + .16}{6} = .887 \text{ MAD}$$

3) 5, 7, 12, 5, 8, 6, 6 $\bar{x} = 7.16$ $s_x = 2.64$

$$\frac{|5-7.16| + |7-7.16| + |12-7.16| + |5-7.16| + |8-7.16| + |6-7.16| + |6-7.16|}{6} = 1.9 \text{ MAD}$$

4) 1, 1, 2, 2, 3, 3 $\bar{x} = 2$ $s_x = .89$

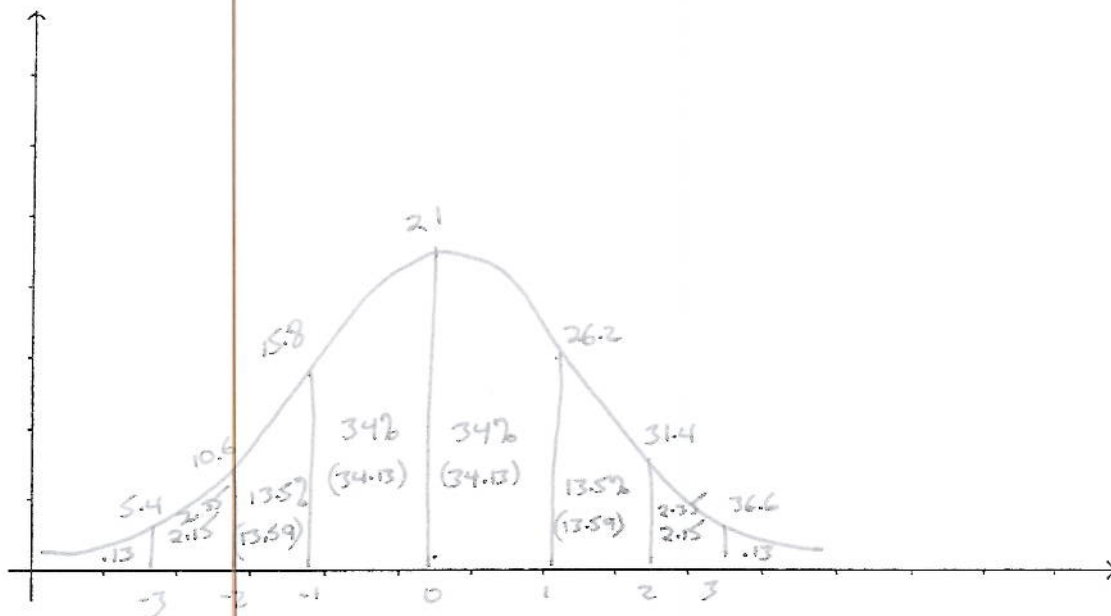
$$\frac{|1-2| + |1-2| + |2-2| + |2-2| + |3-2| + |3-2|}{6}$$

$$= \frac{1 + 1 + 0 + 0 + 1 + 1}{6} = \frac{4}{6} = \frac{2}{3} = .667 \text{ MAD}$$

Just ACT Normal

A Solidify Understanding Task

- One of the most common examples of a normal distribution is the distribution of scores on standardized tests like the ACT. In 2010, the mean score was 21 and the standard deviation was 5.2 (Source: National Center for Education Statistics). Use this information to sketch a normal distribution curve for this test.



- ~~Use technology to check your graph. Did you get the points of inflection in the right places? (Make adjustments, if necessary.)~~

- In "What Is Normal", you learned that the 68 - 95 - 99.7 rule. Use the rule to answer the following questions:

a. What percentage of students scored below 21?

$$13.5 + 34 + 34 + 2.35 + 0.15 = 84.4$$

b. About what percentage of students scored below 16?

$$13.5 + 2.35 + 0.15 = 16.0$$

c. About what percentage of students scored between 11 and 26?

$$13.5 + 34 + 34 = 81.5$$

Mathematics Vision Project | MVP

Licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported license

4. Your friend, Calvin, would like to go to a very selective college that only admits the top 1% of all student applicants. Calvin has good grades and scored 33 on the test. Do you think that Calvin's ACT score gives him a good chance of being admitted? Explain your answer.

$$z = \frac{33-21}{5.2} = 2.31 \rightarrow .9896 \approx \boxed{98.96\%}$$

5. Many students like to eat microwave popcorn as they study for the ACT. Microwave popcorn producers assume that the time it takes for a kernel to pop is distributed normally with a mean of 120 seconds and a standard deviation of 13 for a standard microwave oven. If you're a devoted popcorn studier, you don't want a lot of un-popped kernels, but you know that if you leave the bag in long enough to be sure that all the kernels are popped, some of the popcorn will burn. How much time would you recommend for microwaving the popcorn? Use a normal distribution curve and the features of a normal distribution to explain your answer.

