1. Find $P(z < 1.23)$ = .8907

2. Find $P(z < 1.85)$ = .9678

3. Find $P(-1.52 < z < 1.36)$ = .8488

4. Find and interpret the percentile for your test score if 50 students took the test and only 10 of them scored higher than you. $\frac{40}{50} = 80^{th}$ percentile

5. The Reilly stress index has a distribution that is approximately Normal. The 5th and 95th percentiles for the group of students were found to be 20 and 120 respectively. Find the mean and the standard deviation.

$\bar{x} = \frac{20+120}{2} = 70$

SD = 25
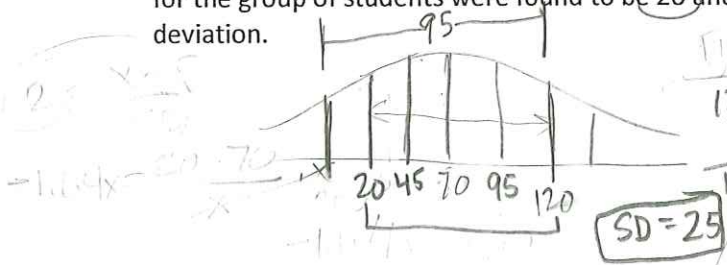
6. The mean of the proportion of yellow M&Ms is 0.14 and the standard deviation is 0.05. The distribution is approximately Normal.

A) Find $P(x < .13)$ $\frac{.13-.14}{.05} = -.2 = z$ $P = .4207$

B) Find $P(x > .15)$ $\frac{.15-.14}{.05} = .2$ $P = .4207$

C) What percentage of proportions fall between 0.04 and 0.19

normcdf $(.04, .19, .14, .05) = .8186 = P$

D) You have a bag of 85 candies. 15 are yellow. Your friend has a bag of 72 candies and 12 are yellow in that bag. Use standardized values to decide which of you has a higher percentage. (yes, I know you can do this without z scores but this is to practice z scores.

You $\frac{15}{85} = .1764$ $z = \frac{.176 - .14}{.05} = .72$ ✗

Friend $\frac{12}{72} = .167$ $z = \frac{.167 - .14}{.05} = .54$

E) You got only one yellow in 24 candies. Is this likely to occur by random chance or did you get jipped?
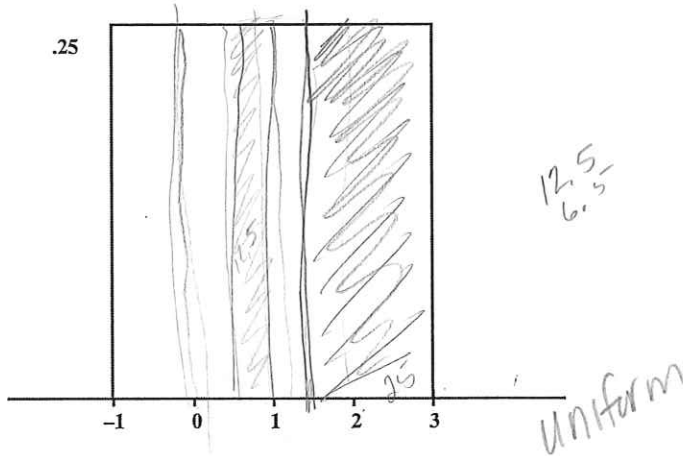
$\frac{1}{24} = .042$ $\frac{.042 - .14}{.05} = -1.96$ $P = .0244$

Jipped   2.4% Chance

Chapter 2: Describing Location in a Distribution

Use the following to answer questions 1 through 3:

1. For this density curve, which of the following is true?
   A) The curve is symmetric.
   B) The interquartile range is 2.
   C) The median is 1.
   D) The total area under the curve is 1.
   E) All of the above.

2. For this density curve, what percentage of the observations lies above 1.5?
   A) Less than 10%.   B) 25%.   C) 37.5%.   D) 50%.   E) 75%.

$$25 + \tfrac{1}{2}(25)$$
$$25 + 12.5 = 37.5$$

3. For this density curve, what percentage of the observations lies between 0.5 and 1.2?
   A) 17.5%.   B) 25%.   C) 35%.   D) 50%.   E) 70%.

4. For the density curve displayed below, the mean is
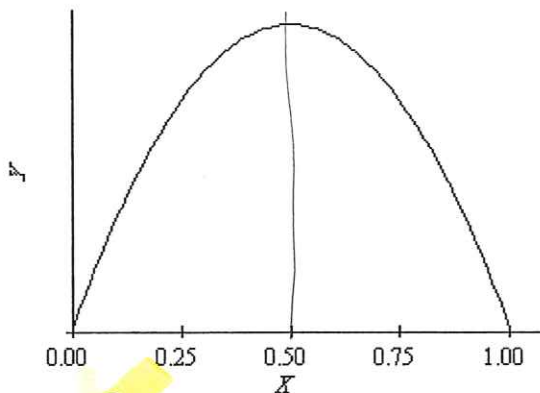
A) 0.25.   B) 0.50.   C) 0.71.   D) 0.75.   E) 1.

5. A normal density curve has which of the following properties?
    A) It is symmetric.
    B) The median is equal to the mean.
    C) The spread of the curve is proportional to the standard deviation.
    D) It has a peak centered above its mean.
    E) All of the above.

6. Items produced by a manufacturing process are supposed to weigh 90 grams. However, the manufacturing process is such that there is variability in the items produced and they do not all weigh exactly 90 grams. The distribution of weights can be approximated by a normal distribution with a mean of 90 grams and a standard deviation of 1 gram. Using the 68–95–99.7 rule, what percentage of the items will either weigh less than 87 grams or more than 93 grams?
    A) 0.3%. B) 3%.   C) 6%.   D) 94%.   E) 99.7%.
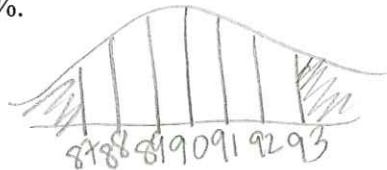
8. Increasing the frequency of observations in the tails of a distribution will
    A) not affect the standard deviation as long as the increases are balanced on either side of the mean.
    B) not affect the standard deviation under any circumstances.
    C) increase the standard deviation.
    D) decrease the standard deviation.
    E) skew the standard deviation.

9. The time it takes for students to complete a standardized exam is approximately normal with a mean of 70 minutes and a standard deviation of 10 minutes. Using the 68–95–99.7 rule, what percentage of students will complete the exam in under an hour?
    A) 68%.   B) 47.5%.   C) 32%.   D) 16%.   E) 5%.

Use the following to answer questions 13 and 14:

The temperature at any random location in a kiln used in the manufacture of bricks is normally distributed with a mean of 1000° F and a standard deviation of 50° F.

13. If bricks are fired at a temperature above 1125°F, they will crack and must be discarded. If the bricks are placed randomly throughout the kiln, the proportion of bricks that crack during the firing process is closest to
    A) 0.62%. B) 2.28%. C) 6.2%. D) 47.72%. E) 49.38%.

$$\frac{1125 - 1000}{50} = P = .0062$$

14. When glazed bricks are put in the oven, they will miscolor if the temperature is below 900°F. If the bricks are placed randomly throughout the kiln, the proportion of glazed bricks that miscolor is closest to
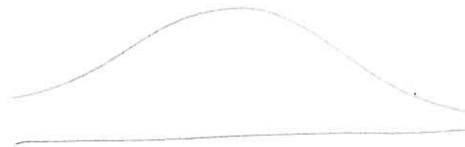   A) 0.62%. B) 2.28%. C) 22.8%. D) 47.72%. E) 49.38%.

$$P(x < 900) \quad \frac{900 - 1000}{50} = -2$$

$$P = .02275$$

29. A stemplot of a set of data is roughly symmetric, but the data do not even approximately follow the 68–95–99.7 rule. We conclude that the data are
    A) normal, but not standard normal.
    B) standard normal.
    C) not normal.
    D) normal.
    E) skewed in both directions.

Name_____

Solve the problem.

1) Find the area under the standard normal curve between z = 0 and z = 3.

.4987

2) Use the standard normal distribution to find P(0 < z < 2.25).

.4878

3) Use the standard normal distribution to find P(–2.25 < z < 0).

.4878

4) Use the standard normal distribution to find P(–2.25 < z < 1.25).

.8822

5) Use the standard normal distribution to find P(–2.50 < z < 1.50).

.9270

$\frac{268}{2.1}$

6) The lengths of pregnancies of humans are normally distributed with a mean of 268 days and a standard deviation of 15 days. A baby is premature if it is born three weeks early. What percentage of babies are born prematurely?

$X < 247$ $z = \frac{247 - 268}{15} = P = .0808$

(21 above 268)

8.08%

7) The lengths of pregnancies of humans are normally distributed with a mean of 268 days and a standard deviation of 15 days. Find the probability of a pregnancy lasting more than 300 days.

$X > 300$ $z = \frac{300 - 268}{15}$ $P = .0164$
$= 1.64\%$

8) The distribution of cholesterol levels in teenage boys is approximately normal with μ = 170 and σ = 30 (Source: U.S. National Center for Health Statistics). Levels above 200 warrant attention. What percentage of teenage boys have levels between 170 and 225?

normalcdf(170, 225, 170, 30) = .4666

46.66%

9) An airline knows from experience that the distribution of the number of suitcases that get lost each week on a certain route is approximately normal with μ = 15.5 and σ = 3.6. What is the probability that during a given week the airline will lose between 10 and 20 suitcases?
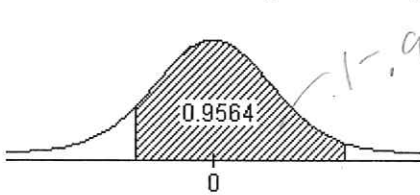
normalcdf(10, 20, 15.5, 3.6) .8314

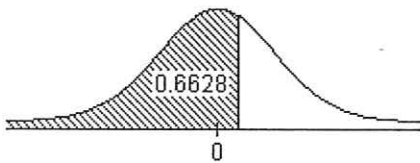10) Find the z-score that corresponds to the given area under the standard normal curve.

0.2810

0
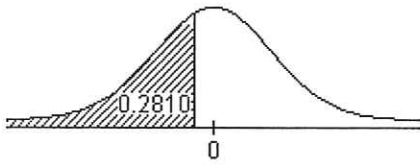
$z = -.58$

11) Find the z-score that corresponds to the given area under the standard normal curve.
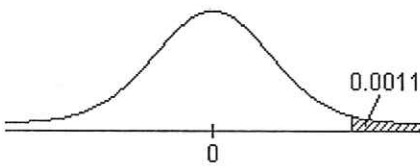
$1 - .9564$

0.9564

0

$-1.71 = z$

12) Find the z-score that corresponds to the given area under the standard normal curve.
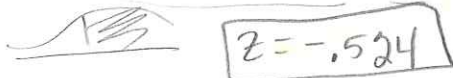
0.6628

0

$z = .4201$

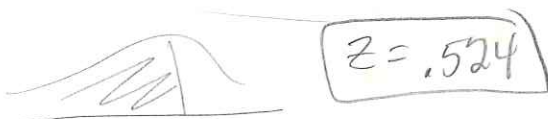13) Find the z-score that corresponds to the given area under the standard normal curve.

0

0.0011

$3.06 = z$

14) Find the z-score that is less than the mean and for which 70% of the distribution's area lies to its right.

$z = -.524$

15) Find the z-score that is greater than the mean and for which 70% of the distribution's area lies to its left.

$z = .524$

2

16) The times for completing one circuit of a bicycle course are normally distributed with a mean of 76.6 minutes and a standard deviation of 4.4 minutes. An association wants to sponsor a race but only wants the fastest 25% of riders included. In a trial run, what should be the cutoff time?

$$z = -.674 = \frac{x - 76.6}{4.4} \qquad \boxed{x = 73.63}$$

17) Assume that the heights of women are normally distributed with a mean of 62.3 inches and a standard deviation of 2.1 inches. Find Q_3, the third quartile that separates the bottom 75% from the top 25%.

$$-.674 = \frac{x - 62.3}{2.1} \qquad \boxed{63.7 = x}$$

18) The body temperatures of adults are normally distributed with a mean of 98.6° F and a standard deviation of 0.13° F. What temperature represents the 95th percentile?

$$1.645 = \frac{x - 98.6}{.13} \qquad \boxed{x = 98.81°}$$

19) A tire company finds the lifespan for one brand of its tires is normally distributed with a mean of 50,500 miles and a standard deviation of 4000 miles. If the manufacturer is willing to replace no more than 10% of the tires, what should be the approximate number of miles for a warranty?

$$\frac{x - 50500}{4000} = -1.28$$

$$\boxed{x = 45373.79}$$

$$\boxed{45380 \text{ miles}}$$