

Name Key Hr _____

1. Determine the following areas under the standard normal curve:

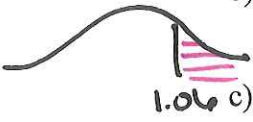
a) The area under the curve to the left of -2.33

.0099



b) The area under the curve to the right of 1.06

.1446



c) The area under the curve between -1.6 and 2.2

.9313



2. Determine each of the following probabilities for random variable z with a standard normal distribution:

a) $P(-1.2 < z < 0.2)$

.4642

b) $P(z > 2.45)$

.0071

c) $P(z \leq -0.32)$

.3745

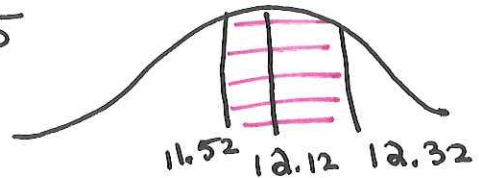
3. The distribution of weights of 12-ounce water bottles is approximately normally distributed with mean $\mu = 12.12$ and standard deviation $\sigma = 0.2$ ounce. Make sure to include a sketch.

a) What percent of 12-ounce bottles weigh between 11.52 and 12.32 ounces?

$P(11.52 < x < 12.32) = .8385$

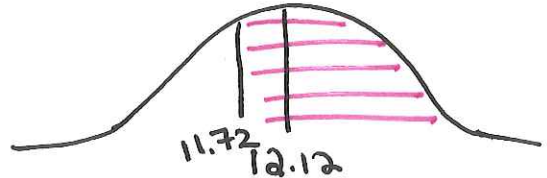
$\mu = 12.12$

$\sigma = 0.2$



b) What is the probability that a bottle weighs at least 11.72 ounces?

$P(x > 11.72) = .975$



4. You are told that your score on an exam is at the 85th percentile of the distribution of scores. What does this mean?

You scored better than 85% of other students on the exam. (Or top 15% of students)

5. If you add 200 to each of the values in a list, describe how the mean, median, standard deviation and IQR of the original list compare to those of the transformed list.

mean + median : + 200

SD and IQR: unchanged

6. If you multiply each of the values in a list by 5, describe how the mean, median, standard deviation and IQR of the original list compare to those of the transformed list.

mean + median : x5

SD and IQR: x5

Can also use 68-95-99.7 Rule

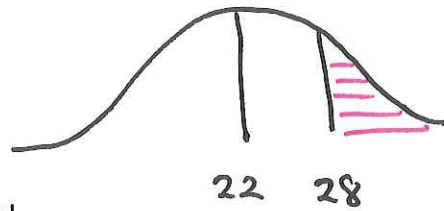
7. Scores on the 2014 ACT¹ for students in Kansas were approximately normally distributed with mean $\mu = 22$ and standard deviation $\sigma = 5$.

a) What percent of students have an ACT score of 28 or better? Include a sketch!

$$P(x > 28) = 11.5\%$$

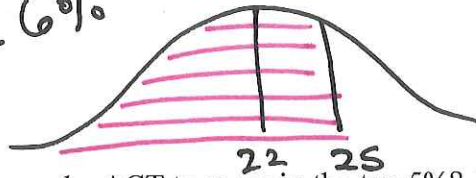
$$\mu = 22$$

$$\sigma = 5$$



b) What percent of scores are under 25? Include a sketch!

$$P(x < 25) = 72.6\%$$

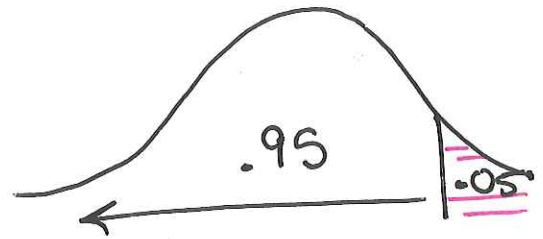


c) What would a student have to earn on the ACT to score in the top 5%? Don't forget the sketch!

$$\text{invNorm}(.95, 22, 5) \approx 30$$

OR $\text{invNorm}(.95) = 1.65$

$$1.65 = \frac{x - 22}{5} \quad x \approx 30$$



8. Items produced by a manufacturing process are supposed to weigh 90 grams. However, because processing errors, there is variability in the items produced. The distribution of weights can be approximated by a Normal distribution with mean 90 grams and standard deviation of 2 grams.

a) About what percentage of items will either weigh less than 87 grams or more than 93 grams?

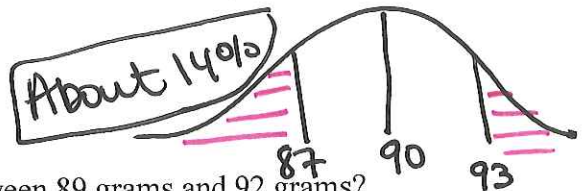
$$\mu = 90$$

$$\sigma = 2$$

$$P(x < 87) \text{ or } P(x > 93)$$

$$= .0668 \quad = .0668$$

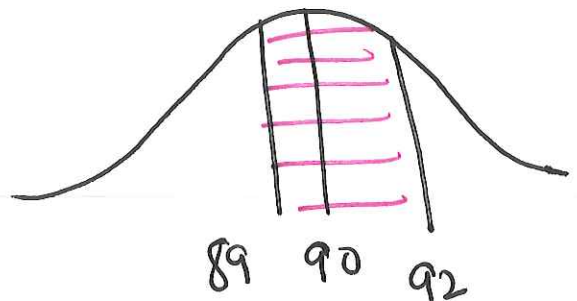
$$.1336$$



b) About what percentage of items will weigh between 89 grams and 92 grams?

$$P(89 < x < 92) = .9521$$

About 95%



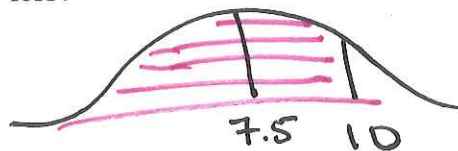
¹ <http://www.act.org/newsroom/data/2014/states/kansas.html>

9. Airplanes arriving at the KCI airport have a mean arrival time of 7.5 minutes late with a standard deviation of 2.5 minutes. The arrival times approximate a normal distribution.

a) What percentage of the planes are 10 minutes late or less?

$$P(X < 10) = 84.9\%$$

$$\mu = 7.5 \quad \sigma = 2.5$$



b) The middle 95% of the arrival times for incoming flights are between what two numbers of minutes late?

$$\rightarrow \pm 2 \text{ S.D.}$$

$$7.5 \pm 2(2.5) = 2.5 \text{ to } 12.5 \text{ minutes late}$$

10. The Cumulative Relative Frequency Chart below represents the distances (in miles) the members of the MHS cross country team ran last week.

a) 80% of the runners ran less than how many miles?

about 45 miles

b) Find the median number of miles ran.

$$\rightarrow 50\%$$

about 32 miles

