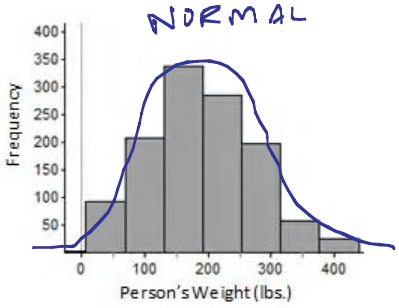
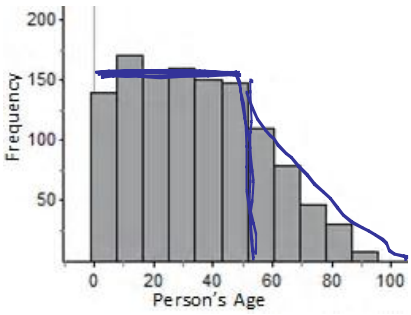
1. The following show some histograms about a data set of 1200 people that live in Atlanta, Ga. Which of the data sets appear to be somewhat normally distributed?

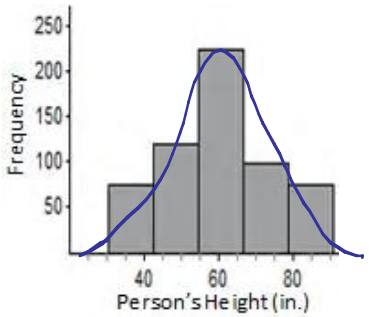
A. NORMAL



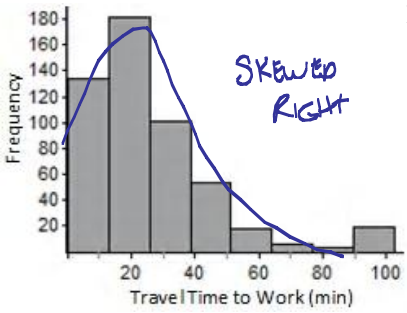
B.



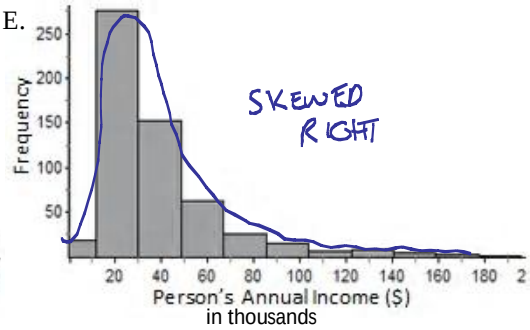
C.



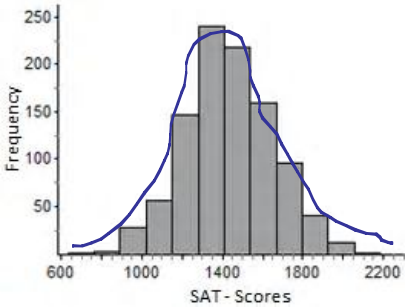
D. SKEWED RIGHT



E. SKEWED RIGHT

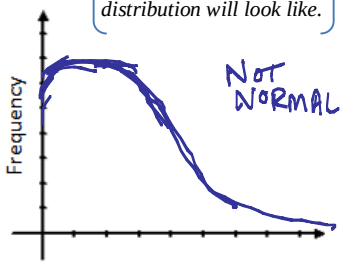


F.



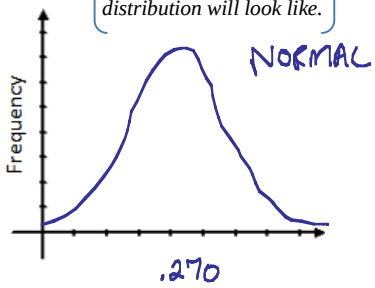
G. The number of siblings each person has in a city.

Sketch what you think the distribution will look like.



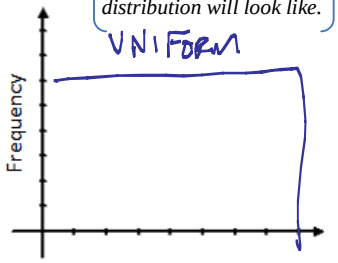
H. The ~~number~~ batting averages of every major league player.

Sketch what you think the distribution will look like.



I. The number of times each number value appears when rolling a six-sided die 120 times.

Sketch what you think the distribution will look like.



2. A person was researching the strength of a particular glue between a metal and wood object. The researcher found that the mean weight held by 2 ml of glue was 1250 grams with a Sample Standard Deviation of 60 grams. Assuming the test provided data that was normally distributed answer the following. (Fill in the normal curve at the bottom)

a. What is the probability that the glue will hold less than 1190 grams?

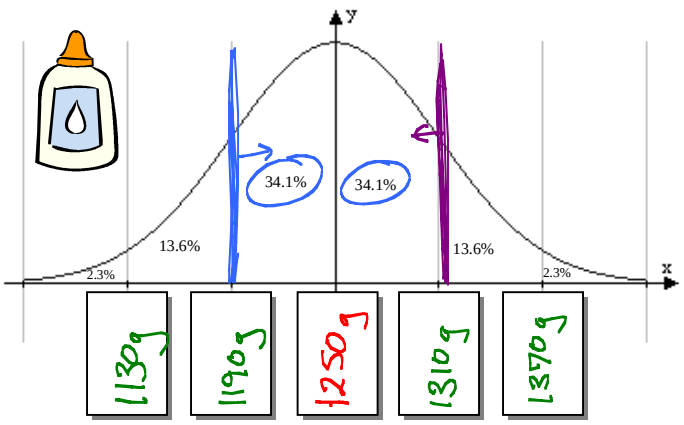
2.3% + 13.6% = 15.9%

b. What is the probability the glue will hold 1370 grams or more?

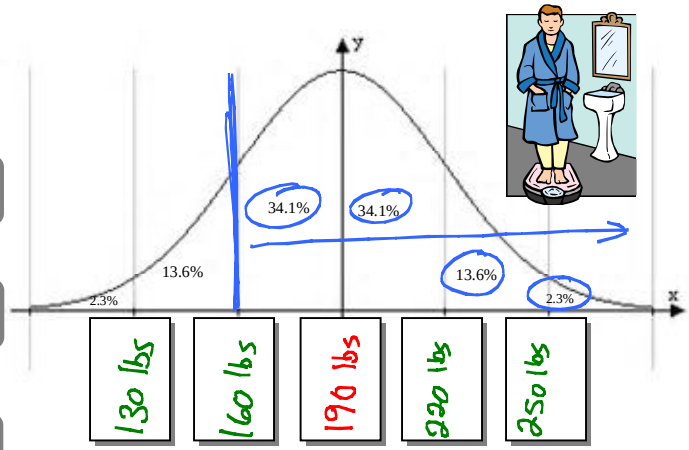
2.3%

c. What are the chances the glue will hold between 1190 and 1310 grams?

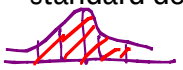
34.1% + 34.1% = 68.2%



3. The approximate weights of adult males in the U.S. are approximately normally distributed, with a mean of about 190 lbs and a standard deviation of 30 lbs. (Fill in the normal curve.)



a. What percentage of men's weights are with in ±2 standard deviations of the mean.



13.6 + 34.1 + 34.1 + 13.6 = **95.4%**

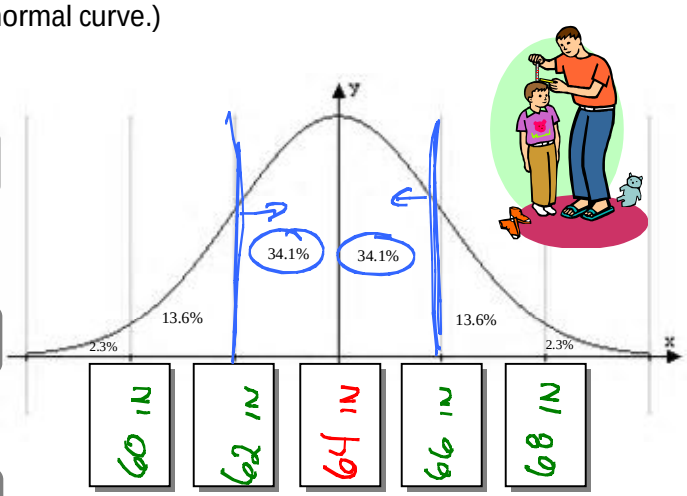
b. 2.3% of men are lighter than 130.

130 lbs.

c. What percentage of the U.S. male population weighs more than 160 pounds?

34.1 + 34.1 + 13.6 + 2.3 = **84.1%**

4. The approximate heights of adult females in the U.S. are approximately normally distributed, with a mean of about 64 in. and a standard deviation of 2 in. (Fill in the normal curve.)



a. What percentage of women's heights are with in ±1 standard deviations of the mean.

34.1 + 34.1 = **68.2%**

b. If there are 13 adult female students in a class how many can you expect will be taller than 66 inches?

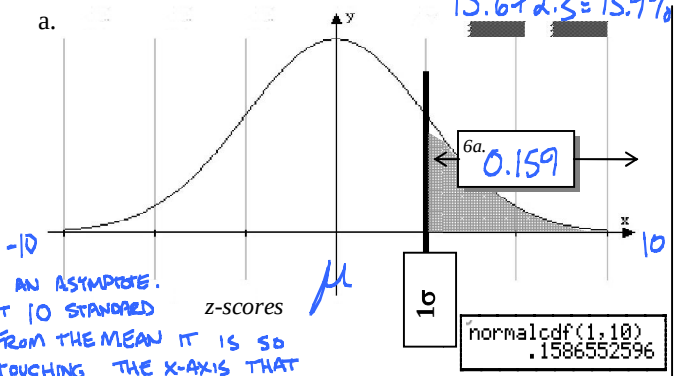
13.6 + 2.3 = 15.9% | 13 * (0.159) ≈ **2 STUDENT**

c. If there are 6 adult female students in a class how many can you expect will be between 62 and 66 in.?

34.1 + 34.1 = 68.2% | 6 * (0.682) ≈ **4 STUDENTS**

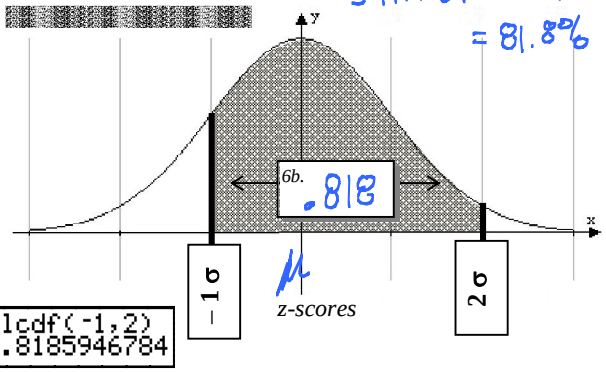
5. Use the **tables** in the back of the book or the calculator's "**normalcdf(**" command to find the following areas.

a. 13.6 + 2.3 = 15.9%

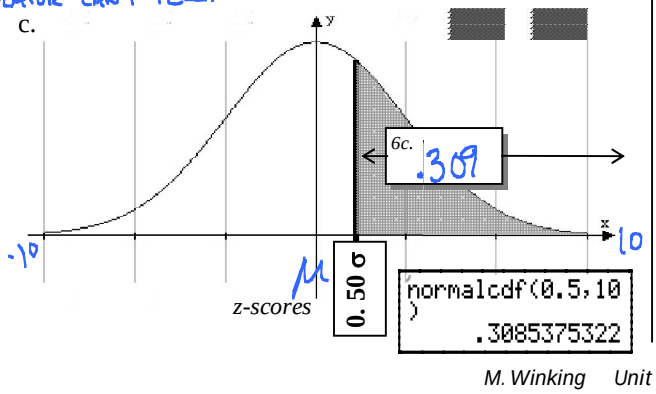


THE X-AXIS IS AN ASYMPTOTE. HOWEVER, AT 10 STANDARD DEVIATIONS FROM THE MEAN IT IS SO CLOSE TO TOUCHING THE X-AXIS THAT YOUR CALCULATOR CAN'T TELL.

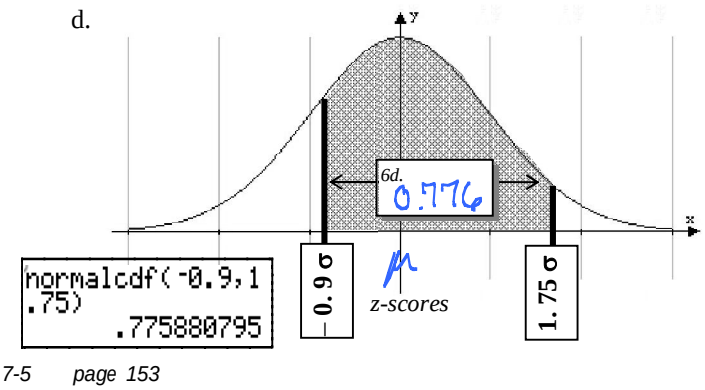
b. 34.1 + 34.1 + 13.6 = 81.8%



c.



d.



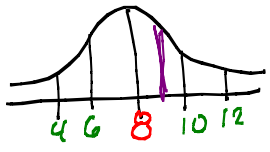
6. Calculate the following z-scores.

   a. Given a data set is normally disturbed with a mean of 8 ($\mu = 8$) and standard deviation of 2 ($\sigma = 2$), what would the z-score of the data point 9?

$$z = \frac{x - \mu}{\sigma}$$ (x: DATA POINT, μ: MEAN, σ: STANDARD DEVIATION)

$$z = \frac{9-8}{2} = \frac{1}{2} = 0.5$$

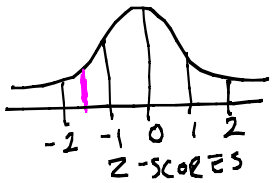
THIS SUGGESTS THAT THE DATA POINT 9 IS 0.5 STANDARD DEVIATIONS AWAY FROM THE MEAN.



   b. Given a data set is normally disturbed with a mean of 17.2 ($\mu = 17.2$) and standard deviation of 5 ($\sigma = 5$), what would the z-score of the data point 10?

$$z = \frac{9 - 17.2}{5} = -1.64$$

THIS SUGGESTS THE DATA POINT 9 IS -1.64 STANDARD DEVIATIONS AWAY FROM THE MEAN.



   c. A study showed that the number of hours a teenager sleeps during the school year is normally distributed with a mean of 7.6 hours and a standard deviation of 1.8 hours. One student sleeps only 6.8 hours each night. What would the z-score be of the data point associated with 6.8 hours?

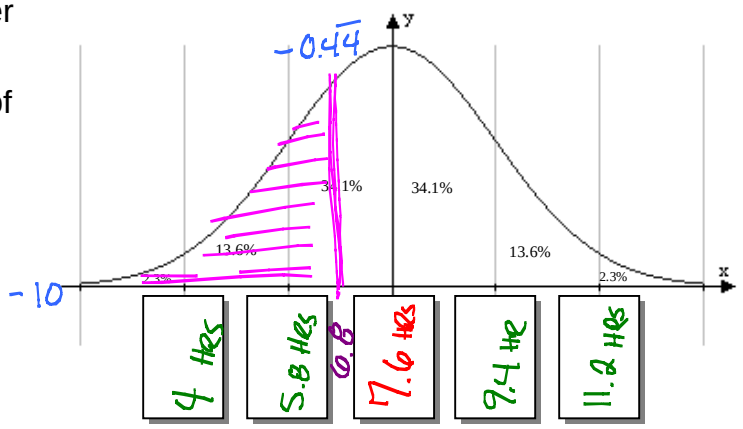
$$z = \frac{6.8 - 7.6}{1.8} = -0.44\overline{4}$$

THE STUDENT'S SLEEP TIME IS $-0.44\overline{4}$ STANDARD DEVIATIONS AWAY FROM THE MEAN.

7. Calculate the following probabilities using z-scores.

   a. A study showed that the number of hours a teenager sleeps during the school year is normally distributed with a mean of 7.6 hours and a standard deviation of 1.8 hours. One student sleeps only 6.8 hours each night. What percentage of students sleep **less than 6.8** hours?

$$z = \frac{6.8 - 7.6}{1.8} = -0.44\overline{4}$$



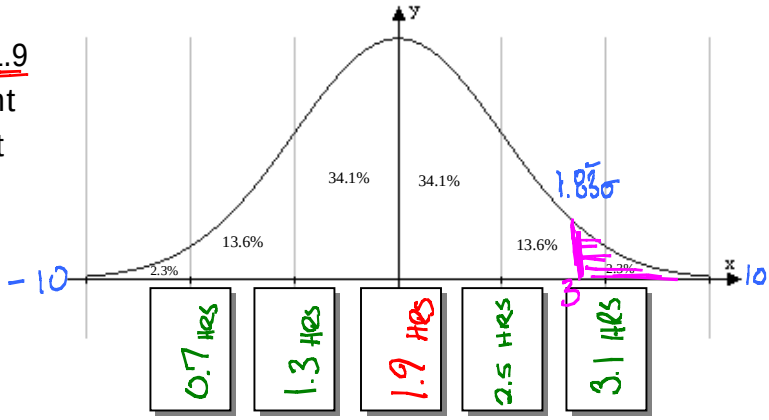
NORMCDF(-10, $-0.44\overline{4}$) ≈ 0.328

normalcdf(-10,-0.4444) .3283767301

APPROXIMATELY 32.8%

   b. A study showed that the average number of hours teenagers spent playing video games per day was 1.9 with a standard deviation of 0.6 hours. One student in class was averaging 3 hours a day. What percent of students play more than 3 hours a day? (assume the data is normally distributed)

$$z = \frac{3 - 1.9}{0.6} = 1.8\overline{3}$$



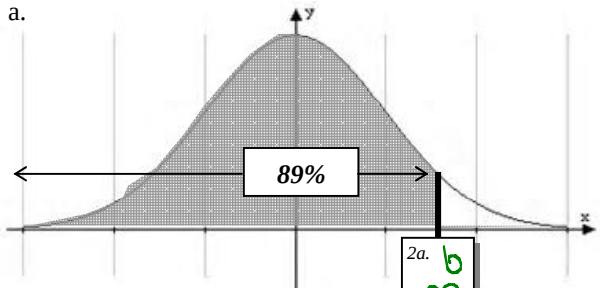
NORMCDF(1.8$\overline{3}$, 10) ≈ 03338

normalcdf(1.833333,10) .0333764731

APPROXIMATELY 3.3%

7. Use the calculator's "**invNorm(**" command to find the following z-scores.

a.

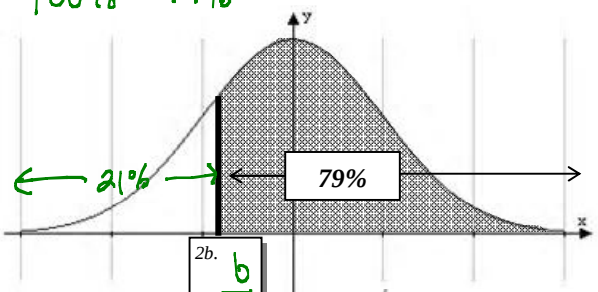


invNorm(0.89)
1.22652812

z-scores

2a. 1.23σ

b. $100\% - 79\% = 21\%$



2b. $-.81\sigma$

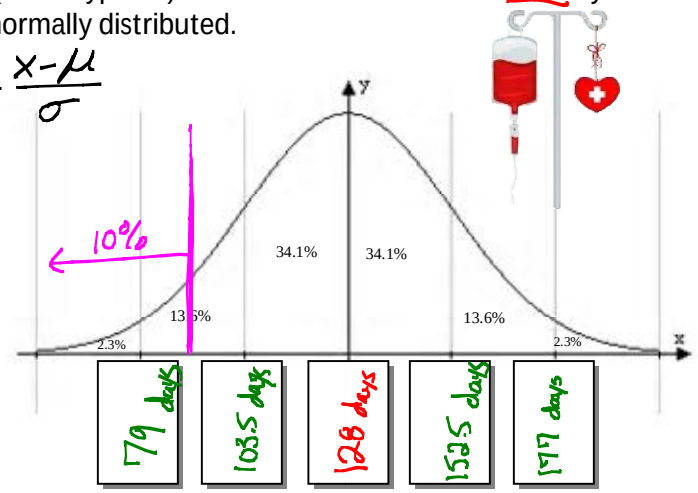
z-scores

invNorm(0.21)
-.8064212507

8. The mean time spent (in days) waiting for a heart transplant (blood type A+) in the State of Wisconsin is 128 days with a standard deviation of 24.5 days and is approximately normally distributed.

a. Fill in the appropriate blanks on the normal curve.

$z = \frac{x-\mu}{\sigma}$



b. What is the shortest time spent waiting for a heart that would still place a patient in the top 20% of wait times?

INVNORM(0.80) ≈ .842

$.842 = \frac{x-128}{24.5}$

$x \approx 148.6$ days

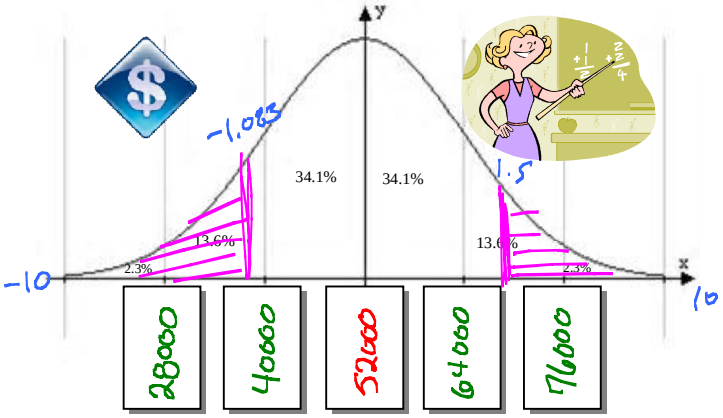
c. What is the longest time spent waiting for a heart that would still place a patient in the bottom 10% of waiting times? INVNORM(0.10) ≈ -1.28

$-1.28 = \frac{x-128}{24.5}$

$x \approx 96.6$ days

9. Teacher salaries in Georgia are normally distributed with a mean salary of $52,000 and a standard deviation of $12,000.

a. Fill in the appropriate blanks on the normal curve.



b. With 20 years of experience and a Specialist's Degree the contract amount for a teacher in GCPS is $70,000. What is the z-score associated with this amount?

$z = \frac{70000 - 52000}{12000}$

1.5σ

c. What percent of teachers make more than this amount in the state of Georgia?

NORMCDF(1.5, 10) ≈

$.067 = 6.7\%$

d. A first year teacher with a only a bachelor's degree has a starting salary of $39000 in Gwinnett. Find the z-score of this value.

$z = \frac{39000 - 52000}{12000} = -1.08\overline{3}$

$-1.08\overline{3}\sigma$

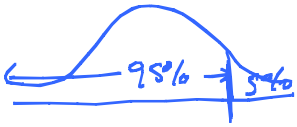
e. What percentage of teachers make less than $39000 in Georgia?

NORMCDF(-10, -1.08$\overline{3}$) ≈

normalcdf(-10,-1.083333)
.1393303568

$\approx 13.9\%$

f. A private school wants to be very competive. What should the average salary of teachers be at the school, if they would like to pay their teachers so that their salaries are in the top 5% of salaries for Georgia?



INVNORM(.95) ≈ 1.645

$1.645 = \frac{x - 52000}{12000}$

$71,740