Name ___Key___                                        Algebra 2 Homework 13-2
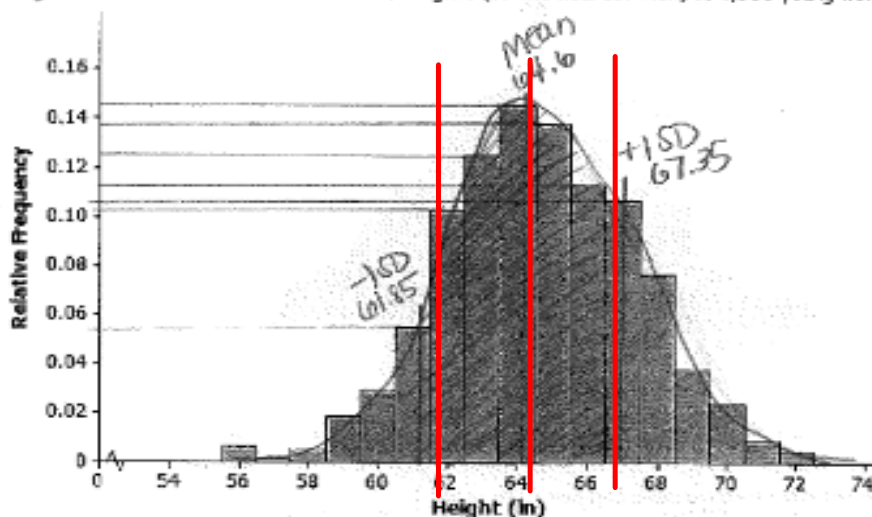
The histogram below shows the distribution of heights (to the nearest inch) of 1,000 young women.



1. What is the width of each bar? What does the height of the bar represent?

   Each bar is 1 inch wide. Height represents proportion of 1000 women at that particular height

2. The mean of the distribution of women's heights is 64.6 inches, and the standard deviation is 2.75 inches. Interpret the mean and standard deviation in this context.

   Mean is avg. height of 1000 women interpreted as typical height value.
   SD is typical # of inches that a women's height is from the mean.

3. Mark the mean on the graph, and mark <u>one</u> deviation above and below the mean. Approximately what proportion of the values in this data set are within one standard deviation of the mean?

   +1 SD: 64.6 + 2.75 = 67.35       .055(.15) + .11 + .125 + .145 + .139
   −1 SD: 64.6 − 2.75 = 61.85                    + .13 + .105(.35)
   .65(.105) + .125 + .145 + .139 + .13 + .11(.85) = .70   = .694       ~69%

4. Draw a smooth curve that comes reasonably close to passing through the midpoints of the tops of the bars in the histogram. Describe the shape of the distribution. Mound shaped ~ Normal

5. Shade the area under the curve that represents the proportion of the data within one standard deviation of the mean.

6. Periodically the U.S. Mint checks the weight of newly minted nickels. Below is a histogram of the weights (in grams) of a random sample of 100 new nickels.
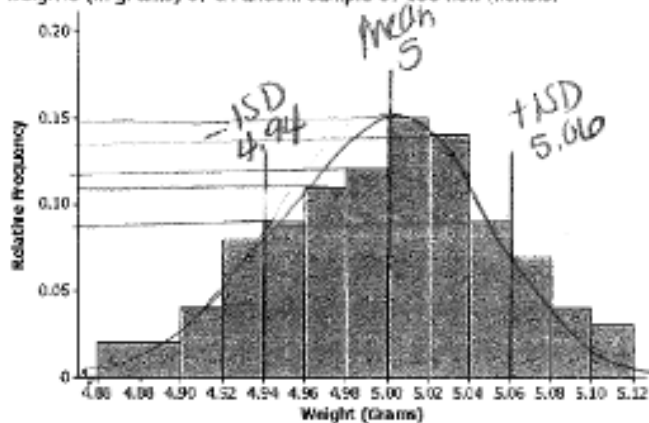


a. The mean and standard deviation of the distribution of nickel weights are 5.00 grams and 0.06 grams, respectively. Mark the mean on the histogram. Mark one standard deviation above the mean and one standard deviation below the mean.

+1SD: $5 + .06 = 5.06$ grams     $-1SD: 5 - .06 = 4.94$ grams

b. Describe the shape of the distribution. Draw a smooth curve that comes reasonably close to passing through the midpoints on the tops of the bars in the histogram. Is this approximately a normal curve?

yes, shape is ~ Normal

c. Shade the area under the curve that represents the proportion of data within one standard deviation above and below the mean. Find the proportion of the data within one standard deviation above and below the mean.

$.09 + .11 + .12 + .15 + .14 + .09$

$= .70$

# Homework Answers 13-3

1. Shape: Approx. Symmetric; Mound Shape

   Center: ~75

   Spread: Range because ~ symmetric

2. Math

3. RockReady

4. a. 0.7123

   *Rounding not Stated*

   b. 0.1151

   c. 0.0708

   d. 0.6368

   e. 0.7058
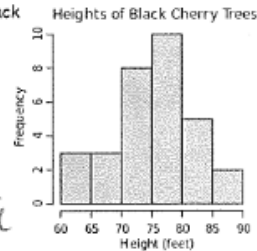
5. a. 0.509

   *Nearest thousandth*

   b. 0.049

   c. 0.810

Name **Key**        Algebra 2 Homework 13-3

1. The histogram to the right shows the distribution of 31 Black Cherry Tree heights. Describe the shape, center, and spread (range or IQR) of this distribution.

Heights of Black Cherry Trees

Shape: ~ symmetric, mound shaped

Center: ~ 75

Spread: Range b/c ~ symmetric

2. An incoming freshman took her college's placement exams in French and mathematics. In French, she scored 82 and in math 86. The overall results on the French exam had a mean of 72 and a standard deviation of 8, while the mean math score was 68, with a standard deviation of 12. On which exam did she do better compared with the other freshman?

French:

$z = \dfrac{82-72}{8}$

$= 1.25$

math:

$z = \dfrac{86-68}{12}$

$= 1.5$

She did better on the math exam b/c she was 1.5 SD above the mean vs. 1.25 SD above the mean on the French.

3. Two companies market new batteries targeted at owners of personal music players. Dura Tunes claims a mean battery life of 11 hours, while RockReady advertises 12 hours. Suppose the standard deviations are 2 hours for Dura Tunes and 1.5 hours for RockReady. You are headed for 8 hours at the beach. Which battery is most likely to last all day? Explain.
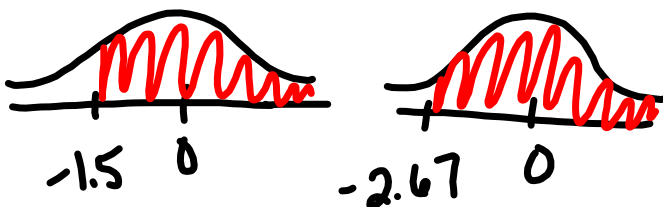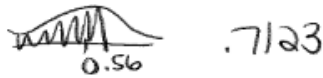
Dura Tunes:

$z = \dfrac{8-11}{2}$
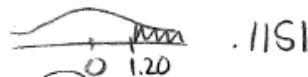
$= -1.5$

RockReady:

$z = \dfrac{8-12}{1.5}$

$= -2.67$

Rock Ready → has larger probabity (area shaded)

-1.5   0      -2.67   0

4. Find

   a.  the area to the left of z = 0.56.      .7123
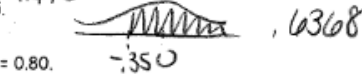
             0.56

   b.  the area to the right of z = 1.20.    .1151
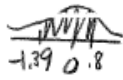
           0  1.20

   c.  the area to the left of z = -1.47.    .0708

            -1.47 0

   d.  the area to the right of z = -0.35.    .6368

   e.  the area between z = -1.39 and z = 0.80.   -.350

-1.39 0 .8    .7059

5. Suppose that a particular medical procedure has a cost that is approximately normally distributed with a mean of $19,800 and a standard deviation of $2,900. For a randomly selected patient, find the probabilities of the following events. Round your answers to the nearest thousandth.

   a.  The procedure costs between $18,000 and $22,000.

$$z = \frac{18000 - 19800}{2900} = -.621$$
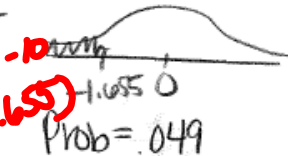
$$z = \frac{22000 - 19800}{2900} = .759$$

-.621 0 .759
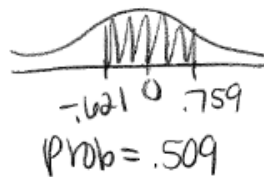
Prob = .509

   b.  The procedure costs less than $15,000.

$$z = \frac{15000 - 19800}{2900} = -1.655$$

-10

normalcdf(-10, -1.655)

-1.655 0

Prob = .049

   c.  The procedure costs more than $17,250.

$$z = \frac{17250 - 19800}{2900} = -.879$$

-.879 0   10

Prob = .810

# QUIZ

Notes # 1, 3-5

1. The U.S. department of Agriculture, in its Official Food Plans (www.cnpp.usda.gov), states that the average cost of food for a 14-18 year old male (on the "Moderate-cost" plan) is $261.50 per month. Assume that the monthly food cost for a 14-18 year old male is approximately normally distributed with a mean of $261.50 and a standard deviation of $16.25.
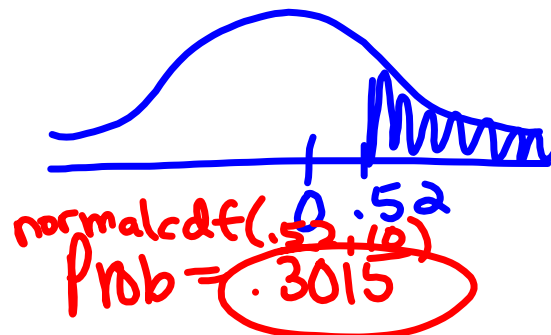
   a. Find the probability that the monthly food cost for a randomly selected 14-18 year old male is

      i. less than $280.
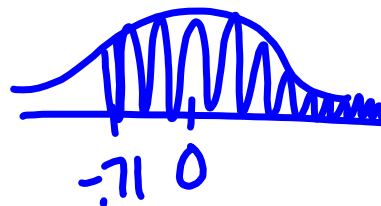
$$Z = \frac{280 - 261.50}{16.25}$$

$$= 1.14$$

normalcdf(-10, 1.14)
Prob = .8729
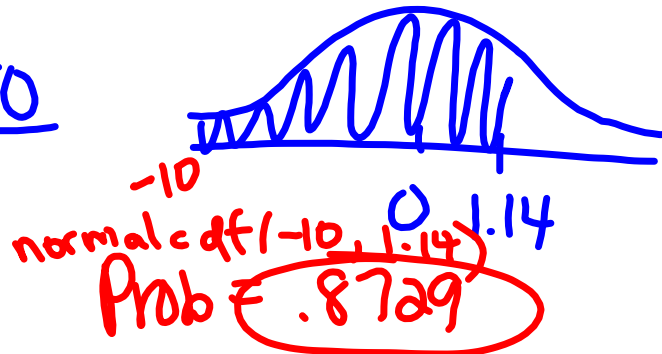
      ii. more than $270.

$$Z = \frac{270 - 261.50}{16.25}$$

$$= .52$$

normalcdf(.52, 10)
Prob = .3015

      iii. more than $250.

$$Z = \frac{250 - 261.50}{16.25} = -.71$$
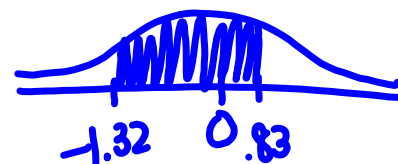
normalcdf(-.71, 10)
Prob = .7611

      iv. between $240 and $275.

240: $$Z = \frac{240 - 261.50}{16.25} = -1.32$$

275: $$Z = \frac{275 - 261.50}{16.25} = .83$$

normalcdf(-1.32, .83) = Prob = .7033

2. The USDA document described in Example 1 also states that the average cost of food for a 14-18 year old female (again, on the "Moderate-cost" plan) is $215.20 per month. Assume that the monthly food cost for a 14-18 year old female is approximately normally distributed with mean $215.20 and standard deviation $14.85.

*OK to Skip*

   a. Find the probability that the monthly food cost for a randomly selected 14-18 year old female is

      i. less than $225.

$$Z = \frac{225 - 215.20}{14.85} = .66$$
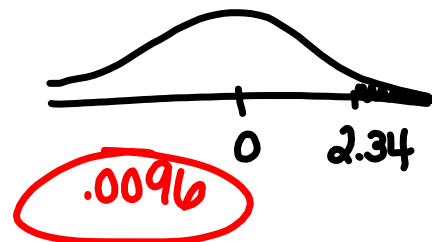
normalcdf(-10, .66) = Prob≈ **.7454**

0 .66

      ii. more than $250.

$$Z = \frac{250 - 215.20}{14.85} = 2.34$$
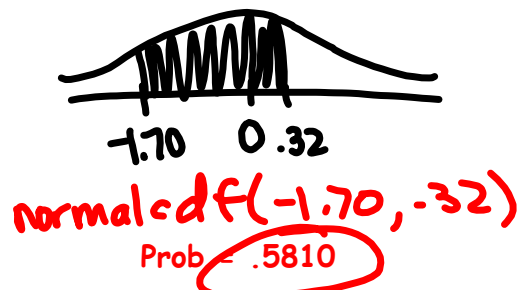
normalcdf(2.34, 10) = **.0096**

0    2.34

      iii. Between $190 and $220.

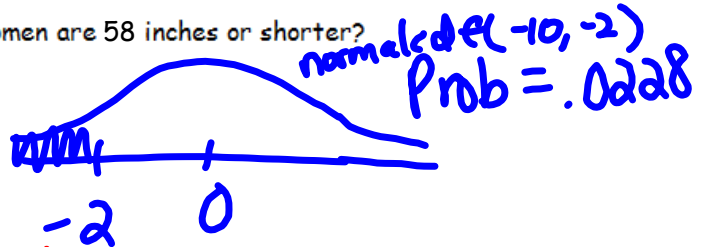190: $$Z = \frac{190 - 215.20}{14.85} = -1.70$$

220: $$Z = \frac{220 - 215.20}{14.85} = .32$$

-1.70   0 .32

normalcdf(-1.70, .32)

Prob ≈ **.5810**

3. Heights of women are normally distributed with a mean of 64 inches and a standard deviation of 3 inches. Out of 90 women, about how many women are 58 inches or shorter?
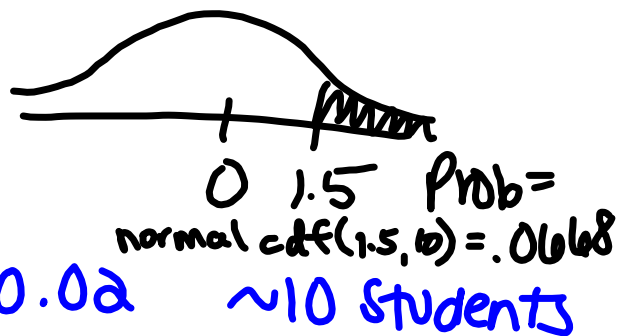
$$Z = \frac{58-64}{3} = -2$$

normalcdf(-10,-2)
Prob = .0228

-2   0

$$90(.0228) = 2.052 \quad \sim 2 \text{ women}$$

4. Scores on an exam are normally distributed with a mean of 80 and a standard deviation of 10. Out of 150 tests, about how many students scored above 95?
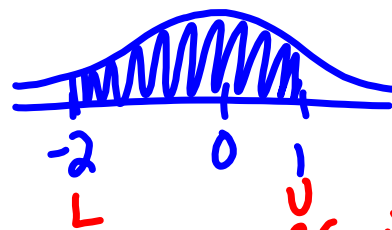
$$Z = \frac{95-80}{10} = 1.5$$

0  1.5   Prob=
normalcdf(1.5, ∞) = .0668

$$150(.0668) = 10.02 \quad \sim 10 \text{ students}$$

5. The mean score on the English section of a standardized examination was 471 and the standard deviation was 89. If 12,000 students took the exam, approximately how many students scored between 293 and 560?

293:  $$Z = \frac{293-471}{89} = -2$$

560:  $$Z = \frac{560-471}{89} = 1$$

-2   0   1
L       U

Prob = normalcdf(-2,1) = .819

$$12,000(.819) = 9828 \text{ students}$$