6.64 Determine the area under the standard normal curve that lies between

a. −0.88 and 2.24. **b.** −2.5 and −2.

c. 1.48 and 2.72. **d.** −5.1 and 1.

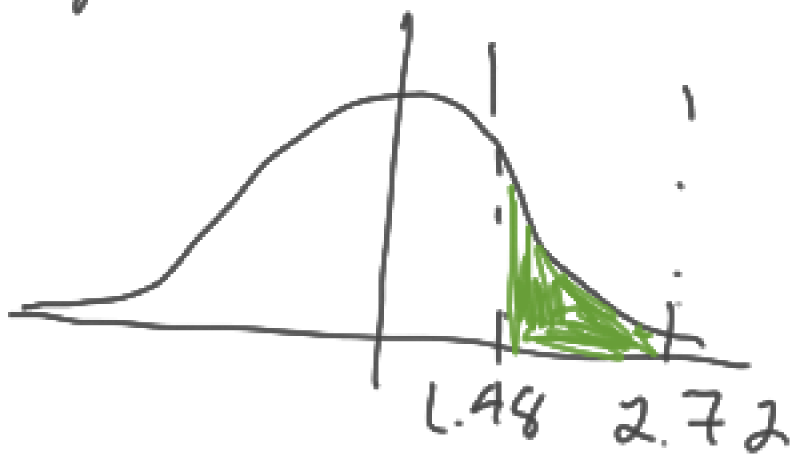
- what to look for to know what to substract?

For any problem asking you to find the area between two z-values follow these steps:

① look up the area in the z-table for each value * area: center numbers *

② larger area minus smaller area

ex: ⓒ



(area of 2.72) − (area of 1.48).

= area between 1.48 and 2.72.

6.66 Find the area under the standard normal curve that lies

a. either to the left of -1 or to the right of 2.

b. either to the left of -2.51 or to the right of -1.

Note:

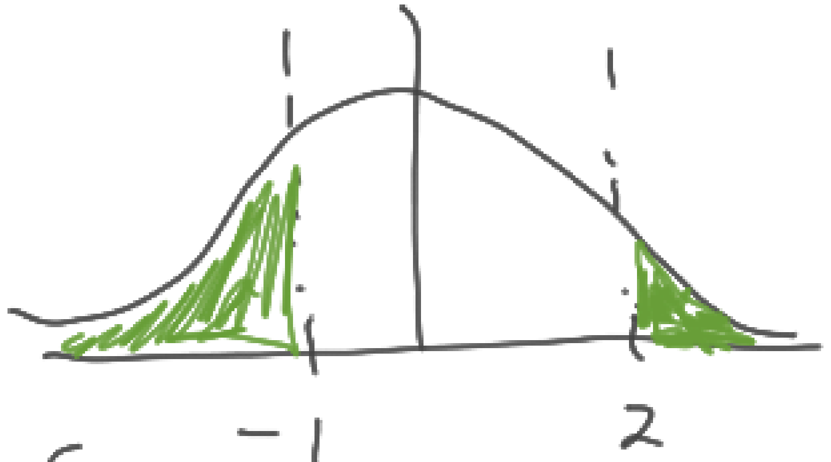
area to the left = area of z-score

area to the right = 1 − area of z-score

When a question ask for the area to the left of z-score or to the right of a z-score follow these steps.

1. find area to the left
2. find area to the right
3. add areas together

Ex (a)



(area of -1) + (1 − area of 2) = total area.

6.98 Serum Cholesterol Levels. According to the *National Health and Nutrition Examination Survey*, published by the National Center for Health Statistics, the serum (noncellular portion of blood) total cholesterol level of U.S. females 20 years old or older is normally distributed with a mean of 206 mg/dL (milligrams per deciliter) and a standard deviation of 44.7 mg/dL.

a. Determine the percentage of U.S. females 20 years old or older who have a serum total cholesterol level between 150 mg/dL and 250 mg/dL.

b. Determine the percentage of U.S. females 20 years old or older who have a serum total cholesterol level below 220 mg/dL.

c. Obtain and interpret the quartiles for serum total cholesterol level of U.S. females 20 years old or older.

d. Find and interpret the fourth decile for serum total cholesterol level of U.S. females 20 years old or older.

Important Statistics

mean (μ) = 206 mg/dL

standard deviation (σ) = 44.7 mg/dL

Important Formulas

$$z = \frac{x - \mu}{\sigma}$$; x is the values from the data

a) ① standardize 150 mg/dL and 250 mg/dL

$x_1 = 150$

$$z_1 = \frac{150 - 206}{44.7} = -1.25$$

$x_2 = 250$

$$z_2 = \frac{250 - 206}{44.7} = .98$$

② find the area from the z-table

$z_1 = -1.25$, area of $z_1 = .0606$

$z_2 = 0.98$, area of $z_2 = .8365$

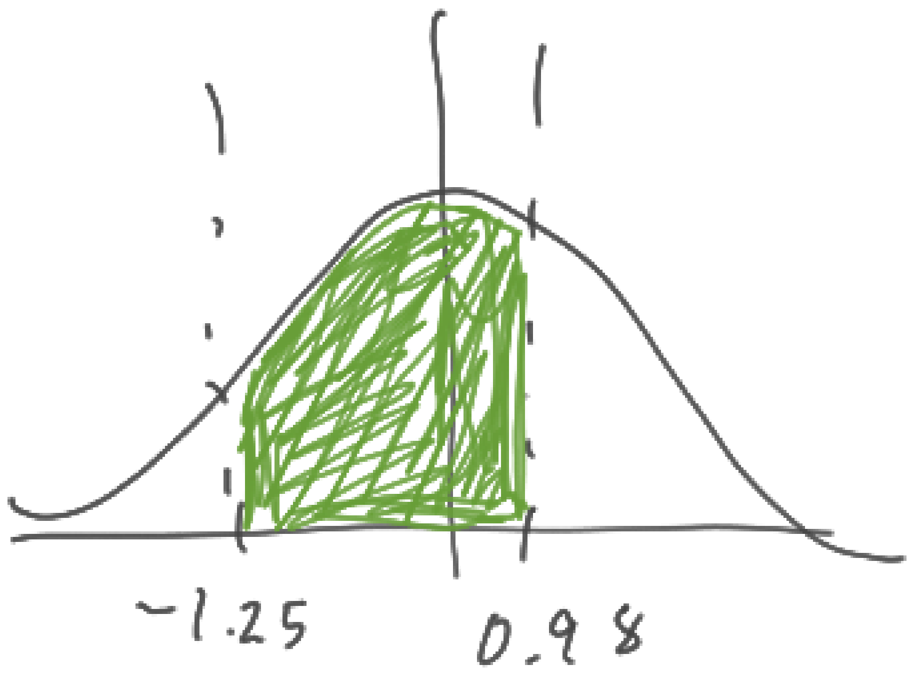
③ find the area between the number

* Note: should always be positive *

$.8365 - .0606 = .7759$

④ what is the percentage?

77.95% of females 20 or older have blood serum cholesterol level between 150 mg/dL and 250 mg/dL



b) ① standardize 220mg/dL

$$z = \frac{220 - 206}{44.7} = .31$$

② area of $z = .31$

.6217

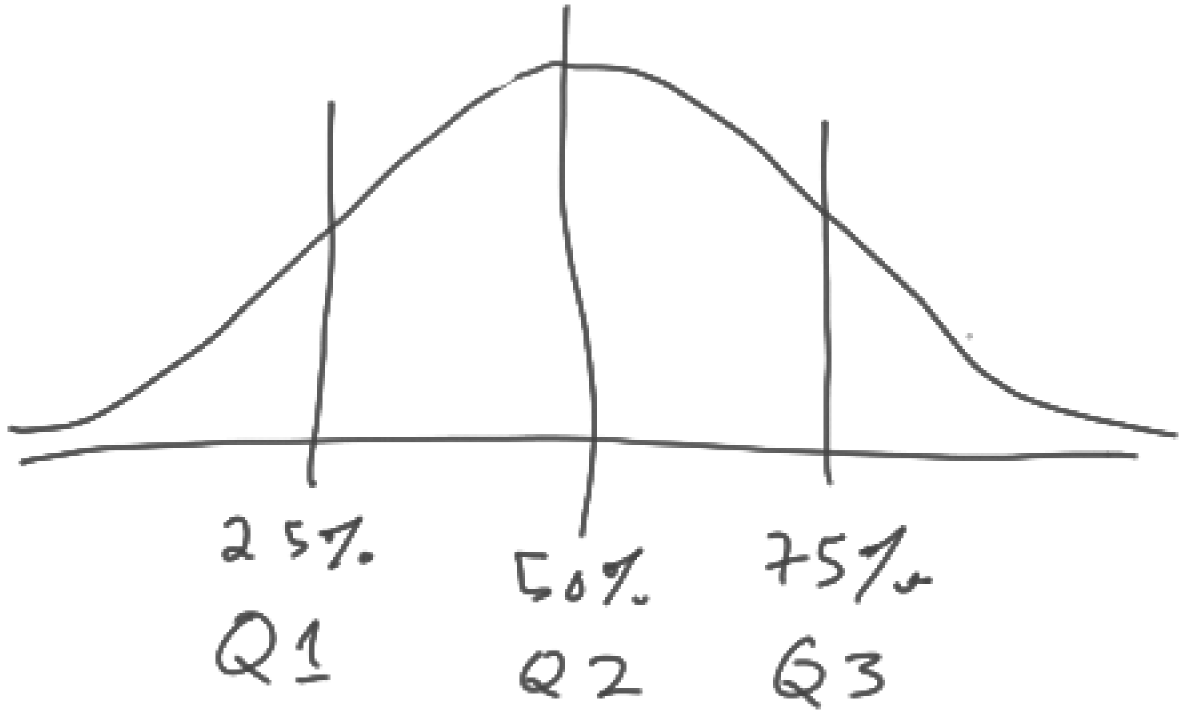
③ "below" = left so no changes

④ percentage

62.17% have levels below 220mg/dL

c) Find Q_1, Q_2, Q_3

Quartiles



Q_1 area = 0.25

① find $z_{0.25} = -.67$

② use $z = \dfrac{x-\mu}{\sigma}$ to solve for x.

$$-.67 = \frac{x - 206}{44.7}$$

$$-.67(44.7) = x - 206$$

$$-.67(44.7) + 206 = x$$

$$176.051 = x$$

③ interpret: 25% have levels below 176.051 mg/dL

Q_2 area = .50

Q_3 area = .75

To on your own.

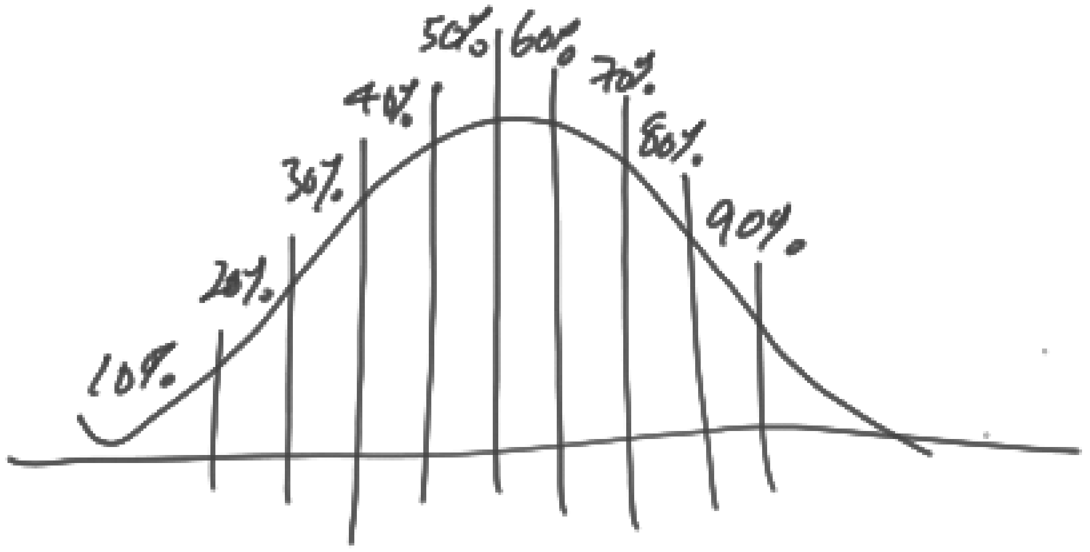
d) fourth decile

Area $= .40$

① $z_{.40} = -.25$

finish on your own

Decile



6.100 Green Sea Urchins. From the paper "Effects of Chronic Nitrate Exposure on Gonad Growth in Green Sea Urchin *Strongylocentrotus droebachiensis*" (*Aquaculture*, Vol. 242, No. 1–4, pp. 357–363) by S. Siikavuopio et al., we found that weights of adult green sea urchins are normally distributed with mean 52.0 g and standard deviation 17.2 g.

a. Find the percentage of adult green sea urchins with weights between 50 g and 60 g.

b. Obtain the percentage of adult green sea urchins with weights above 40 g. * "above" = right * 1 – area of z-score

c. Determine and interpret the 90th percentile for the weights.

d. Find and interpret the 6th decile for the weights.

Important Statistics

mean (μ) = 52.0g

SD (σ) = 17.2g.

a) ① standardize 50 and 60

$x_1 = 50$

$$z_1 = \frac{50-52.0}{17.2}$$

$z_1 = -.166$

$x_2 = 60$

$$z_2 = \frac{60-52.0}{17.2}$$

$z_2 = .47$

② area of z-scores

area of z_1 = .4364

area of z_2 = .6808

③ area between z-scores

.6808 – .4364 = .2444

④ percentage

24.44% have weigh between 50g and 60g.

6.104 Friendship Motivation. In the article "Assessing Friendship Motivation During Preadolescence and Early Adolescence" (*Journal of Early Adolescence*, Vol. 25, No. 3, pp. 367–385), J. Richard and B. Schneider described the properties of the Friendship Motivation Scale for Children (FMSC), a scale designed to assess children's desire for friendships. Two interesting conclusions are that friends generally report similar levels of the FMSC and girls tend to score higher on the FMSC than boys. Boys in the seventh grade scored a mean of 9.32 with a standard deviation of 1.71, and girls in the seventh grade scored a mean of 10.04 with a standard deviation of 1.83. Assuming that FMSC scores are normally distributed, determine the percentage of seventh-grade boys who have FMSC scores within

a. one standard deviation to either side of the mean.
b. two standard deviations to either side of the mean.
c. three standard deviations to either side of the mean.
d. Repeat parts (a)–(c) for seventh-grade girls.

<u>Important Statistics</u>

Boys : mean (μ) = 9.32
SD (σ) = 1.71

Girls : mean (μ) = 10.04
SD (σ) = 1.83

a) ① find values $\mu - \sigma$ and $\mu + \sigma$

$\mu - \sigma = 9.32 - 1.71 = 7.61$

$\mu + \sigma = 9.32 + 1.71 = 11.03$

② standardize 7.61 and 11.03

$$z_1 = \frac{7.61 - 9.32}{1.71} = -1.00$$

$$z_2 = \frac{11.03 - 9.32}{1.71} = 1.00$$

rest of a) on your own.

b) "$\mu - 2\sigma$, $\mu + 2\sigma$" $= \mu \pm 2\sigma$

c) "$\mu - 3\sigma$, $\mu + 3\sigma$" $= \mu \pm 3\sigma$

d) repeat with girls.

6.106 Children Watching TV. The A. C. Nielsen Company reported in the *Nielsen Report on Television* that the mean weekly television viewing time for children aged 2–6 years is 24.85 hours. Assume that the weekly television viewing times of such children are normally distributed with a standard deviation of 6.23 hours and apply the empirical rule to fill in the blanks.

a. Approximately 68% of all such children watch between ______ and ______ hours of TV per week.

b. Approximately 95% of all such children watch between ______ and ______ hours of TV per week.

c. Approximately 99.7% of all such children watch between ______ and ______ hours of TV per week.

d. Draw graphs similar to those in Fig. 6.27 on page 283 to portray your results.

Exit Minimal Video

a) 68% of data is between

$\mu - \sigma$ and $\mu + \sigma$

$\mu - \sigma = 24.85 - 6.23 = 18.62$

$\mu + \sigma = 24.85 + 6.23 = 31.08$

"between 18.62 and 31.08 hours"

Important Statistics

mean (μ) = 24.85 hours

SD (σ) = 6.23 hours

Emperical Rule

For normally distributed data:

68% of data is between $\mu \pm \sigma$.

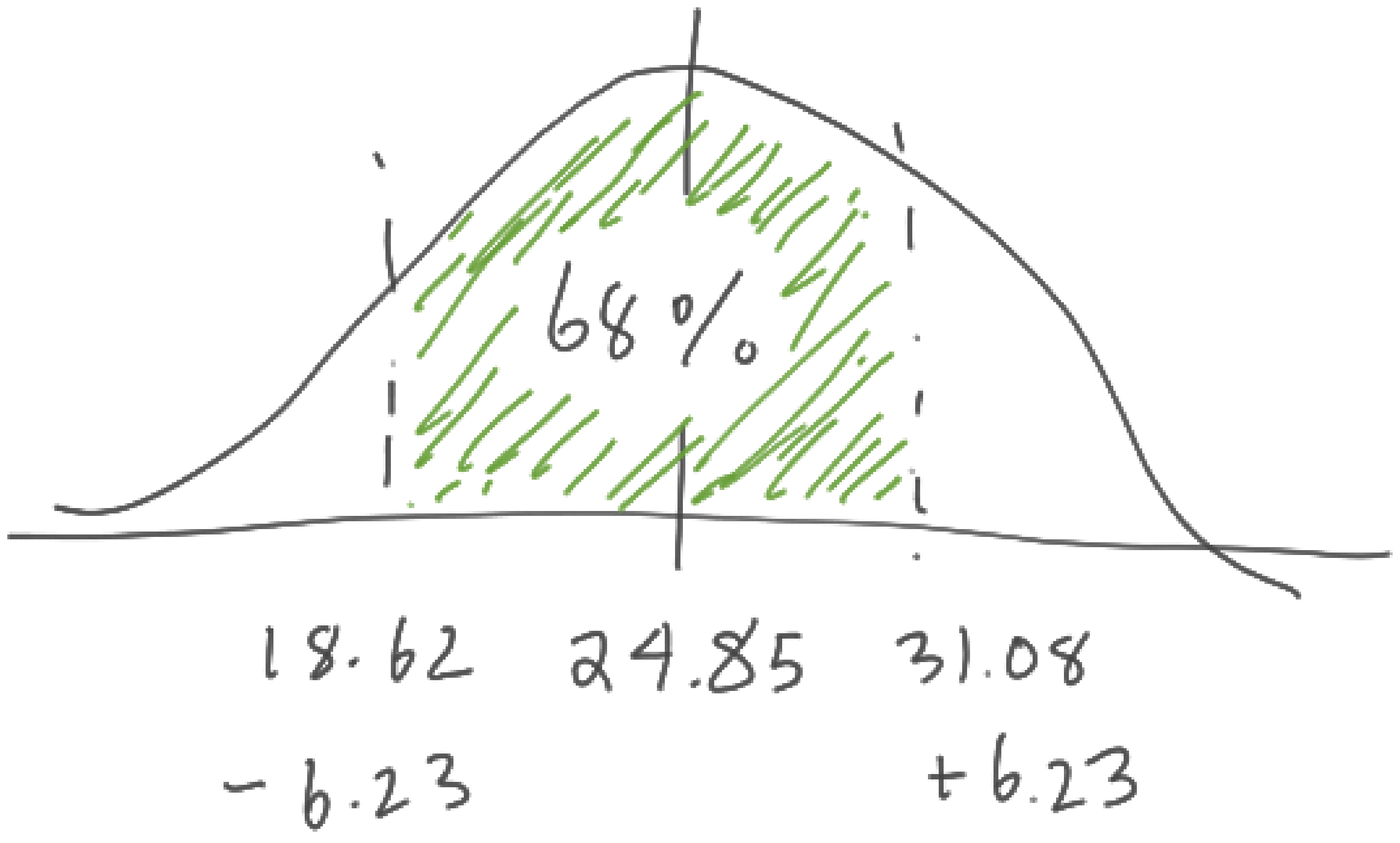
95% of data is between $\mu \pm 2\sigma$

99.7% of data is between $\mu \pm 3\sigma$

b) and c) on your own.

d)

from part a)



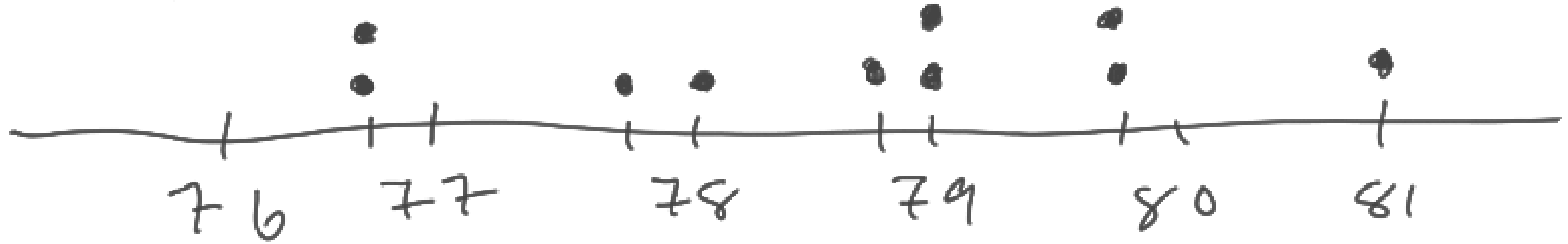
do graphs for b) and c) on your own

7.13 NBA Champs. Repeat parts (b)–(e) of Exercise 7.11 for samples of size 3.

b)

Sample	Height	$\bar{x}$
B, W, J	83, 76, 80	79.66
B, W, C	83, 76, 74	77.66
B, W, H	83, 76, 80	79.66
W, J, C	76, 80, 74	76.66
W, J, H	76, 80, 80	78.66
J, C, H	80, 74, 80	78
B, J, C	83, 80, 74	79
B, C, H	83, 74, 80	79
B, J, H	83, 80, 80	81
W, C, H	76, 74, 80	76.66

c)



7.11 NBA Champs. The winner of the 2012–2013 National Basketball Association (NBA) championship was the Miami Heat. One possible starting lineup for that team is as follows.

Player	Position	Height (in.)
Chris Bosh (B)	Center	83
Dwyane Wade (W)	Guard	76
LeBron James (J)	Forward	80
Mario Chalmers (C)	Guard	74
Udonis Haslem (H)	Forward	80

a. Find the population mean height of the five players.

b. For samples of size 2, construct a table similar to Table 7.2 on page 310. Use the letter in parentheses after each player's name to represent each player.

c. Draw a dotplot for the sampling distribution of the sample mean for samples of size 2.

d. For a random sample of size 2, what is the chance that the sample mean will equal the population mean?

e. For a random sample of size 2, obtain the probability that the sampling error made in estimating the population mean by the sample mean will be 1 inch or less; that is, determine the probability that $\bar{x}$ will be within 1 inch of μ. Interpret your result in terms of percentages.

d) $\mu = \dfrac{83+76+80+74+80}{5}$

$= 78.6$

No samples means equal the population mean

so our chance is $\dfrac{0}{10} = 0$

0% chance

e) (1) determine the range of valid sample means

samples between 77.6 and 79.6

(2) number of sample means between 77.6 and 79.6

5 sample means

(3) probabilty is $\dfrac{5}{10} = 0.5$, so there is a 50% chance of the sample mean falling within 1 inch of μ.