

# Chapter 5 Questions

- 1) Mr. Martens had his Block 1-4 and Block 2-3 Foundations classes write a quiz out of 12. He marks the quizzes and finds the scores for each student below.

Math Quiz (out of 12)							
Block 1-4				Block 2-3			
<del>6</del>	<del>9</del>	<del>12</del>	<del>8</del>	<del>2</del>	<del>9</del>	<del>11</del>	<del>8</del>
<del>4</del>	<del>7</del>	<del>9</del>	<del>8</del>	<del>7</del>	<del>8</del>	<del>7</del>	<del>11</del>
<del>6</del>	<del>4</del>	<del>8</del>	<del>5</del>	<del>1</del>	<del>9</del>	<del>10</del>	<del>11</del>

Determine the mean, median, mode, range and outliers for each class.

Block 1-4  
 Mean =  $6 + 9 + \dots + 5 = 86$   
 $86 \div 12 = 7.2$

Median  
 4, 4, 5, 6, 6, 7, 8, 8, 8, 9, 9, 12  
 both in the middle  
 so... median = 7.5

Mode = 8 happens most

Range =  $12 - 4 = 8$

Outliers = 12 only

Block 2-3  
 Mean =  $2 + 9 + 11 + 6 + \dots + 10 = 81$   
 $81 \div 11 = 7.4$

Median  
 1, 2, 6, 7, 7, 8, 9, 9, 10, 11, 11

Mode = 7, 9 and 11

Range =  $11 - 1 = 10$

Outliers = 1 and 2

- 2) The starting five players for the Dallas Mavericks earn the following salaries:

\$350,000

\$375,000

\$600,000

\$825,000

\$12,000,000

Which measure of central tendency (mean, median, or mode) would be the most useful for analyzing the salaries of the players? Justify your answer.

Median, because

- (a) they are all the Mode (not helpful)
- (b) if you calculated Mean, the \$12,000,000 player would bring the Mean up too high! (not useful)

- 3) Which measure of central tendency would be the most useful for analyzing the sizes of shirts to be stocked at American Eagle? Justify your answer.

Mode, want to sell the size that sells the most

4) Determine if the following scenario is possible:

Jordan and Geoff both do homework regularly. The amount of time they spend on homework every day has the same mean: 50 min. However, the range of Jordan's homework time per day is 20 min, while the range of Geoff's homework time per day is 90 min.

Is this scenario possible? Justify your answer.

Yes, and here's an example.

Jordan's homework time = 40 min, 60 min.

$$\text{Range} = 60 - 40 = 20$$

$$\text{Mean} = \frac{40 + 60}{2} = 50$$

Geoff's homework time = 5 min, 95 min

$$\text{Range} = 95 - 5 = 90$$

$$\text{Mean} = \frac{5 + 95}{2} = 50$$

5) Caroline went bowling. In her first three games, she got a score of 110 every time. In her fourth game, she got a score of 125. What score would Caroline have to get in her fifth game to have a mean of 125? (2 marks)

Five games in total, so ... sum of all games  $\div 5 = \text{mean}$

or ... sum of all games =  $5 \cdot \text{mean}$

$$\text{sum of all games} = 5 \cdot 125$$

$$\text{sum of all games} = 625$$

$$\underline{110} + \underline{110} + \underline{110} + \underline{125} + \underline{?} = 625$$

$$? = 625 - 110 - 110 - 110 - 125$$

$$? = \boxed{170} \text{ in her fifth game to have mean of } 125!$$

6) The percent grades for Mr. Martens' Foundations 11 classes in 2011 and 2012 were grouped and recorded on a frequency table.

Percent Grades	Frequency	
	2011	2012
10-25	1	0
25-40	2	3
40-55	2	0
55-70	7	12
70-85	16	8
85-100	2	7
Total	30	30

On the same graph, draw frequency polygons to show the percent grades in each year. Be sure to label your graph completely!



7) From the previous question, one of Mr. Martens' students got a percent grade of 55%. In which interval did Mr. Martens place this piece of data?

40-55% interval (always goes in lower interval if on boundary)

8) Mr. Fast's Grade 10 Girls PE class ran 15 laps around the track for fitness testing and recorded their times (in minutes). Their times are below:

~~40~~   ~~41.5~~   ~~43~~   ~~36~~   ~~28~~   ~~37.5~~   ~~48~~   ~~30~~   ~~35~~  
~~42.5~~   ~~37~~   ~~39~~   ~~29.5~~   ~~22~~   ~~29~~   ~~35.5~~   ~~25~~   ~~33~~  
~~47~~   ~~39~~   ~~31~~   ~~34~~   ~~52~~   ~~36~~   ~~38~~   ~~38.5~~   ~~42.5~~

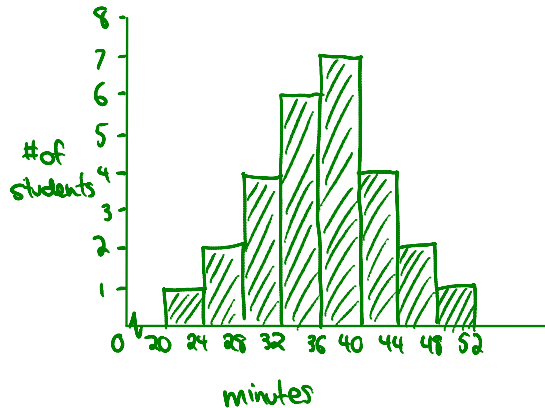
a) Make a frequency table with eight intervals to organize the times.

b) Construct a histogram of the data. Label your histogram completely!

Lowest = 22 minutes  
Highest = 52 minutes.

Interval (minutes)	20-24	24-28	28-32	32-36	36-40	40-44	44-48	48-52
Frequency	1	2	4	6	7	4	2	1

Mr. Fast Gr 10 Girls 15 lap times.



- 9) Carl and Eric each have a mean score of 135 when they go bowling. However, Carl has a standard deviation of 5.8 and Eric has a standard deviation of 10.5. Who is the more consistent bowler, Carl or Eric? Justify your answer.

Carl, because his standard deviation is lower!

- 10) Jasmine's recorded her test scores in Foundations of Math 11.

67%, 73%, 63%, 78%, 92%, 83%, 76%

Determine, using technology, the mean and standard deviation of Jasmine's test scores. Round your answers to 3 decimal places. (3 marks)

Mean ( $\bar{x}$ ) = 76  
 Standard deviation ( $\sigma$ ) = 9.008

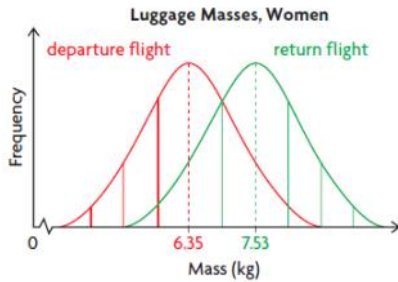
- 11) Hector took a survey to determine how many hours of TV his classmates watched per week. He grouped his results in the frequency distribution table.

Hours of TV (week)	0-4	4-8	8-12	12-16	16-20	20-24
Frequency	3	5	4	12	0	6

Determine, using technology, the mean and standard deviation for the number of hours Hector's class watches TV per week. (4 marks)

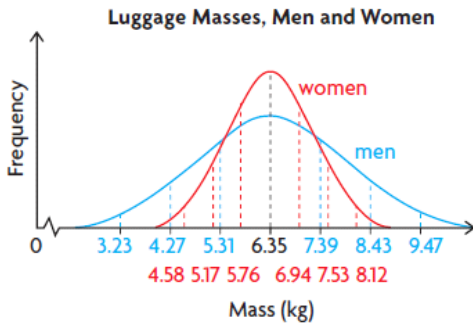
Mean ( $\bar{x}$ ) = 12.53  
 Standard deviation ( $\sigma$ ) = 6.152

12) Based on the distribution of the masses of luggage for women on departure and return flights, what comparison of the distributions is true? (1 mark)



- a) The mean is equal; the standard deviation for the departure flight is greater.
- b) The mean is equal; the standard deviation for the return flight is greater.
- c) The standard deviation is equal; the mean for the return flight is greater.**
- d) The mean and standard deviation for the return flight is greater.

13) Based on the distribution of the masses of luggage for women and men on departure flights, what comparison of the distributions is true? (1 mark)



- a) The standard deviation is equal; the mean luggage mass for women is greater.
- b) The standard deviation is equal; the mean luggage mass for men is greater.
- c) The mean is equal; the standard deviation for women is greater.
- d) The mean is equal; the standard deviation of men is greater.** ← Men are more spread out → less consistent → higher standard deviation

14) Which set of data is normally distributed? (1 mark)

- a) Data 1 only
- b) Data 2 only**
- c) Data 3 only
- d) Data 1 and 2
- e) Data 2 and 3
- f) Data 1 and 3
- g) All data is normally distributed

↑  
symmetrical and bell shaped

Data 1

Interval	1-4	5-8	9-12	13-16	17-20	21-24
Freq.	7	18	11	6	4	1

↪ No!

Data 2

Interval	10-25	25-40	40-55	55-70	70-85	85-100
Freq.	2	4	13	15	3	1

↪ Yes!

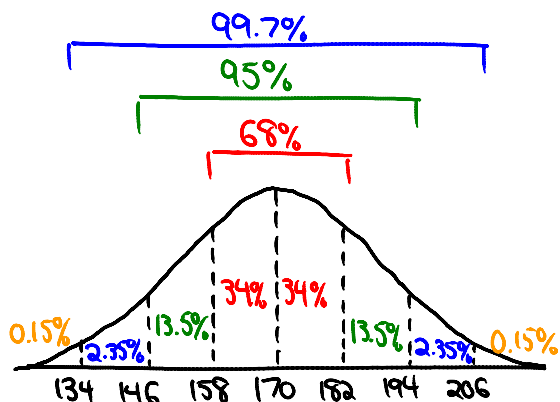
Data 3

Interval	0-10	11-20	21-30	31-40	41-50	51-60
Freq.	7	4	12	12	4	7

↪ No!

15) Mr. Stead had his Grade 9 boys run 2400 m and then recorded their heart rates (beats per min). He found that the heart rates were normally distributed, with a mean of 170 and a standard deviation of 12.

- What percent of boys had a heart rate between 170 and 194?
- What percent of boys had a heart rate between 134 and 182?
- What percent of boys had a heart rate below 146?
- If Mr. Stead's class had 28 boys, how many of them had a heart rate above 158?



a)  $34\% + 13.5\% = 47.5\%$

b)  $2.35\% + 13.5\% + 34\% + 34\% =$

$83.85\%$

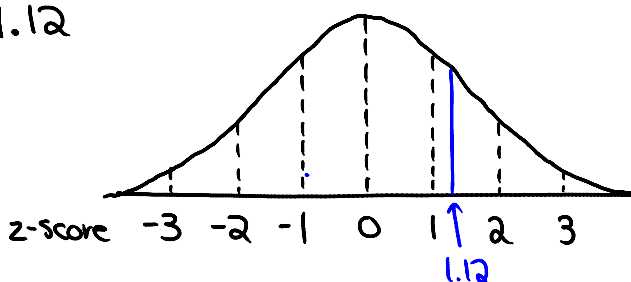
c)  $0.15\% + 2.35\% = 2.5\%$

d)  $34\% + 34\% + 13.5\% + 2.35\% + 0.15\% =$

so...  $84\%$  of 28  
 $0.84 \times 28 = 23.52 = 24$  students

16) Determine the percent of data to the right of the z-score below.

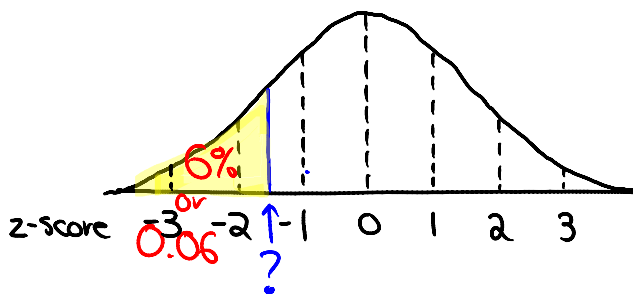
1.12



from z-score table, 86.86% below (left)

so...  $100\% - 86.86\% = 13.14\%$  to the right (above)

17) Determine the z-score that has approximately 6% of data to its left (to 2 decimal places).

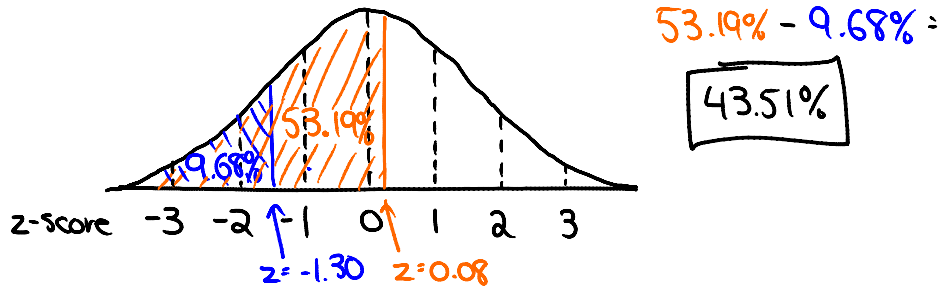


\* look for 0.06 on the inside of z-score table to find z-score!

\* z-score =  $\boxed{-1.55}$  or  $\boxed{-1.56}$

18) Determine the percent data between the pair of z-scores below.

-1.30 and 0.08



19) Calculate the z-score from the information below (to 2 decimal places).

$\mu = 98, \sigma = 13.2, x = 110$

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

$$z = \frac{110 - 98}{13.2}$$

$$z = \frac{12}{13.2}$$

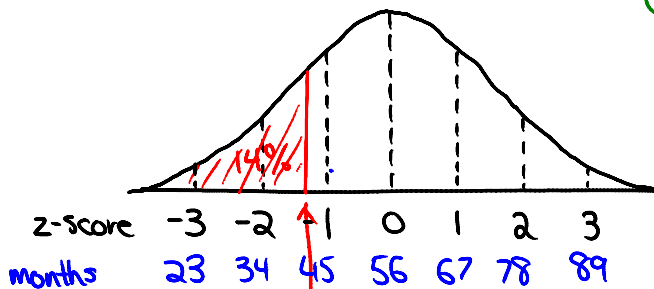
$z = \boxed{0.91}$

20) Apple has determined that the useful battery life of the I-Pod Nano has a mean of 56 months, with a standard deviation of approximately 11 months.

a) Nancy bought a Nano that had to be replaced when only 14% of people would have to replace their Nanos. After how many months did she have to replace her Nano? (to 1 decimal place).

b) In a population of 20 000, approximately how many people would have to replace their Nanos before 5 years (60 months)? (to the nearest whole)

Ⓐ



①  $z = -1.08$

Ⓐ  $z = \frac{x - \mu}{\sigma}$

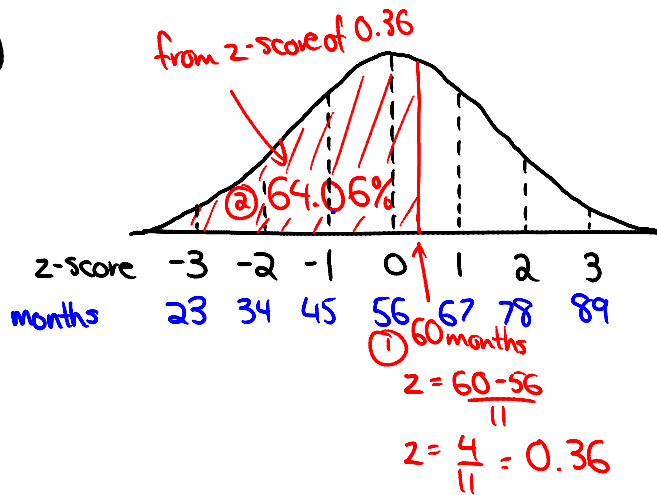
$$-1.08 = \frac{x - 56}{11}$$

$$-11.88 = x - 56$$

$\boxed{44.1}$  = x

months

(b)



③ 64.06% of 20000  
 $0.6406 \times 20000 =$   
**12812** people

21) A telephone survey of 400 randomly selected people was conducted in an urban area. The survey determined that 48% of people have a Facebook account. The results are accurate within plus or minus 6 percent points, 19 times out of 20.

- What is the margin of error for the data?  $\pm 6\%$
- What is the confidence interval for the data?  $42 - 54\%$  or  $48 \pm 6\%$
- What is the confidence level of the survey?  $19 \div 20 = 0.95 \times 100 = 95\%$
- If the margin of error for the survey remained the same, what would have to happen to the sample size in order for the confidence level to increase? (increase, decrease, or remain the same) **increase sample size**
- ~~If the sample size for the survey remained the same and the confidence level decreased, what would happen to the margin of error? (increase, decrease, or remain the same)~~

22) The range of a set of data is 122 and the minimum value is 87. To display this data in a histogram, Nat chose intervals of 20 starting with 80-99. How many intervals will her histogram have?

- 10
  - 9
  - 7**
  - 8
- Min value = 87  
Range = 122 means max value =  $87 + 122 = 209$

Intervals are:

80-99  
100-119  
120-139  
140-159  
160-179  
180-199  
200-219

**7 intervals**



- 23) At the end of a bowling tournament, three friends analyzed their scores.  
 Erinn's mean bowling score is 92 with a standard deviation of 14.  
 Declan's mean bowling score is 130 with a standard deviation of 18.  
 Matt's mean bowling score is 116 with a standard deviation of 22.

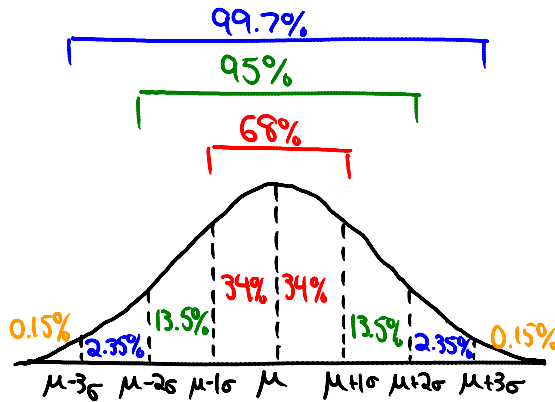
Who is the more consistent bowler?

- a. Impossible to tell.
- b. Declan
- c. Matt
- d. Erinn

More consistent = smaller standard deviation = Erinn

- 24) A set of data is normally distributed. What percent of the data is within two standard deviation of the mean?

- a. about 68%
- b. 100%
- c. about 50%
- d. about 95%



- 25) Which description does not describe the normal curve?

- a. shaped like a bell
- b. starts off increasing
- c. symmetrical
- d. always increasing

- 26) A teacher is analyzing the class results for a physics test. The marks are normally distributed with a mean ( $\mu$ ) of 76 and a standard deviation ( $\sigma$ ) of 4.

Determine Guy's mark if he scored  $\mu + 2\sigma$ .

$$\begin{aligned} \text{Guy} &= \mu + 2\sigma \\ &= 76 + 2(4) \\ &= 76 + 8 \\ &= \boxed{84} \end{aligned}$$

- a. 80
- b. 72
- c. 84
- d. 68

- 27) Which sample size will have the least margin of error?

- a. 3000
- b. 1000
- c. 2000
- d. It is impossible to tell.

28) Joe rolled two dice 50 times and recorded the sum on the frequency table below

Sum	2	3	4	5	6	7	8	9	10	11	12
Frequency	1	2	3	6	7	11	9	5	4	2	0

a) Is the data in this set normally distributed? *Yes*

Justify your answer briefly. *Symmetrical, shaped like bell!*

b) Calculate the mean and standard deviation for the data (round to 2 decimal places) Use a graphing calculator!

*Mean = 6.96*  
*S.D = 2.06*

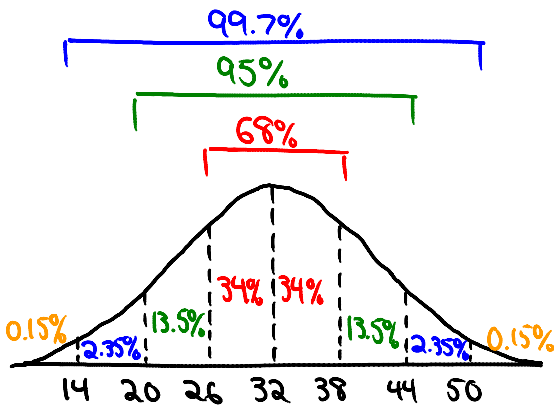
29) The ages of members in a hiking club are normally distributed, with a mean of 32 and a standard deviation of 6 years. Answer the following questions based on the normal distribution curve.

a) What percent of hikers are between 26 and 38 years old?

b) What percent of hikers are younger than 20 years old?

c) What percent of hikers are between 32 and 50 years old?

d) If the hiking club has a total of 65 people, how many of them are between 32 and 50 years old?



Ⓐ  $34 + 34 = 68\%$

Ⓑ  $0.15 + 2.35 = 2.50\%$

Ⓒ  $34 + 13.5 + 2.35 = 49.85\%$

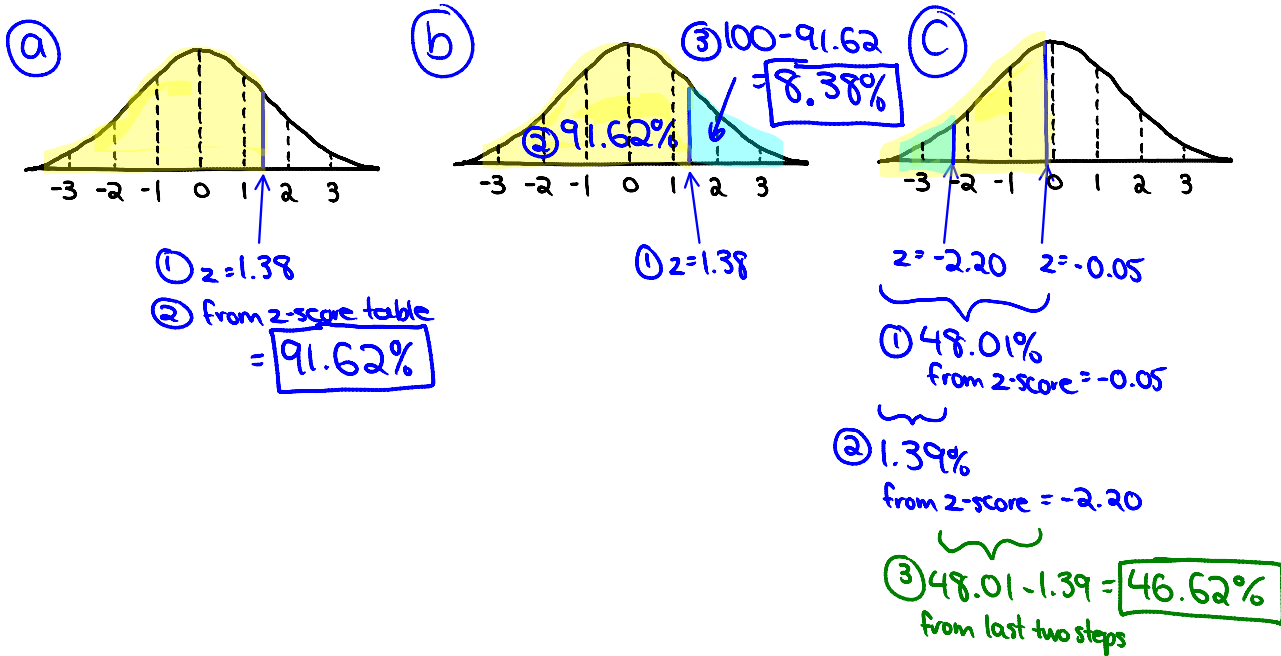
Ⓓ 49.85% of 65

$0.4985 \times 65 = 32.4025$

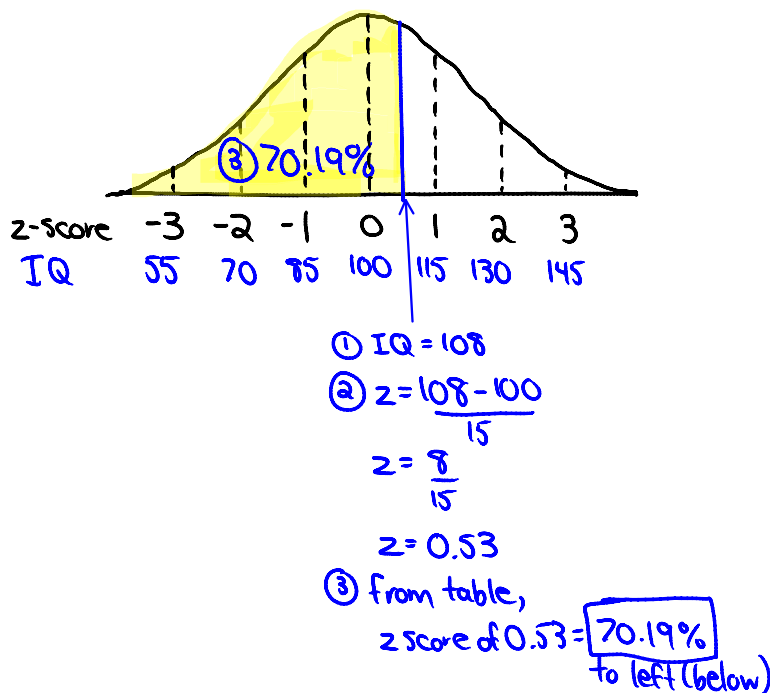
$= 32 \text{ people}$

30) Use the z-score table to answer the following.

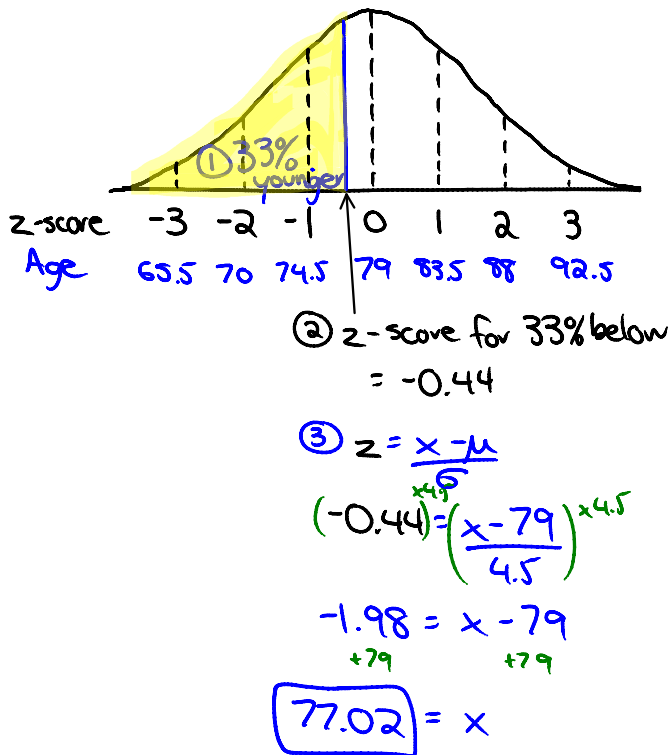
- a) What percent of data is to the left of a z-score of 1.38?
- b) What percent of data is to the right of a z-score of 1.38?
- c) What percent of data is between the z-scores -2.20 and -0.05?



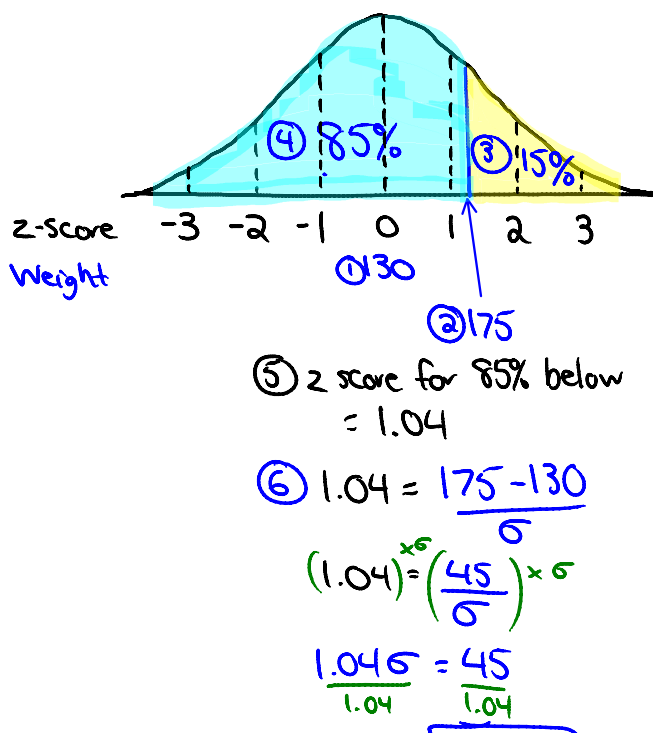
31) IQ is normally distributed. It has a mean of 100 and a standard deviation of 15. If you have an IQ of 108, what percent of people have a lower IQ than you?



- 32) An old folks' home has a mean age of 79 with a standard deviation of 4.5 years. If Stella is older than 33% of the people in the home, how old is she (round your answer to 2 decimal places).



- 33) In a normally distributed population, 50% of the adults are heavier than 130 pounds and 15% are heavier than 175 pounds. Determine the standard deviation for this population, to 2 decimal places.



$$\sigma = \boxed{43.27}$$

34) An advertisement for a new toothpaste states that 80% of users reported better dental checkups. The results of the poll are accurate within  $\pm 4\%$ , 9 times out of 10.

a) What is the margin of error for the data? (1 mark)  $\pm 4\%$

b) What is the confidence interval for the data? (1 mark)  $80 \pm 4\%$  or

$76 - 84\%$   
c) What is the confidence level of the survey? (1 mark)  $9 \div 10 = 0.9 \times 100 = 90\%$

d) If 1000 people were surveyed, state the range of the number of people who reported better dental checkups (1 mark)  $76\% \text{ of } 1000 = 0.76 \times 1000 = \boxed{760}$

$84\% \text{ of } 1000 = 0.84 \times 1000 = \boxed{840}$  between 760 and 840 people

e) What are two things that could be done in order to increase the confidence level of the study? (2 marks) ① survey more people

② increase margin of error ③ increase confidence interval

35) The results of a survey have a confidence interval of 28% to 35%, 19 times out of 20. Determine the margin of error for the survey.

$$35 - 28 = 7 \div 2 = 3.5 \leftarrow \text{so } \boxed{\pm 3.5\%}$$