Statistics Ch 2 Variables 101

Population mean	Summation of	Sample mean
Population variance	Population standard deviation	Sample variance
Sample standard deviation	Range ← no symbol for it	Sample size
Population size ← N		

Write on the lines below what each symbol stands for. Use the words above for your choices.

1. s^2 sample variance
2. Σ summation of
3. μ population mean
4. σ population standard deviation
5. s sample standard deviation
6. $\bar{x}$ sample mean
7. σ^2 population variance
8. n sample size

Lists only 2ND + 4 ENTER

to Clear Ram: 2ND + 7 1 2

Calculator Steps

1) Putting numbers into a list STAT ENTER

2) List Operations 2ND STAT OPS 2ND 1

$x-\mu$
Deviation $L_2 = L_1 - 6551$

Deviations² $L_3 = L_2^2$

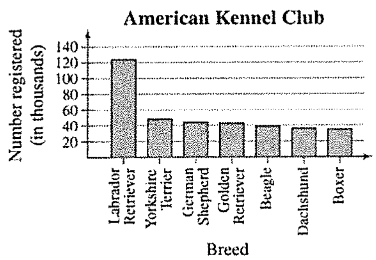
L_4 = cumulativeSum(L_3)
2ND STAT OPS 6 2ND 3) ENTER
LOOK at last #

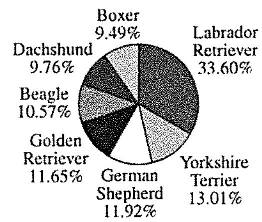
3) Finding mean, median, standard deviation STAT CALC ENTER 3X
scroll down to see

4) Finding the 5-number summary (see above), then scroll down

12-16-19 HW
ANS

10. 

11. 

12. 

13. $\bar{x} = 9.1$

median $= 8.5$

mode $= 7$

14. $\bar{x} = 40.6$

median $= 42$

mode $= 42$

pg. 118-120

14-18 even
22-30 even
31-34
37-40
45-48

15.

Midpoint, x	Frequency, f	xf
21.5	1	21.5
25.5	2	51.0
29.5	6	177.0
33.5	7	234.5
37.5	4	150.0
	$n = 20$	$\Sigma xf = 634$

$$\bar{x} = \frac{\Sigma xf}{n} = \frac{634}{20} = 31.7$$

16.

x	f	xf
0	13	0
1	9	9
2	19	38
3	8	24
4	5	20
5	2	10
6	4	24
	$n = 60$	$\Sigma xf = 125$

$$\bar{x} = \frac{\Sigma xf}{n} = \frac{125}{60} \approx 2.1$$

17. $$\bar{x} = \frac{\Sigma xw}{w} = \frac{(78)(0.15) + (72)(0.15) + (86)(0.15) + (91)(0.15) + (87)(0.15) + (80)(0.25)}{0.15 + 0.15 + 0.15 + 0.15 + 0.15 + 0.25}$$

$$= \frac{82.1}{1} = 82.1$$

18. $\bar{x} = \dfrac{\Sigma xw}{w} = \dfrac{(96)(0.20) + (85)(0.20) + (91)(0.20) + (86)(0.40)}{0.20 + 0.20 + 0.20 + 0.40}$

$= \dfrac{88.8}{1} = 88.8$

19. Skewed **20.** Skewed **21.** Skewed left

22. Skewed right **23.** Median **24.** Mean

25. Range = Max − Min = 8.26 − 5.46 = 2.8

26. Range = Max − Min = 19.73 − 15.89 = 3.84

27. $\mu = \dfrac{\Sigma x}{N} = \dfrac{96}{14} = 6.9$

$\sigma = \sqrt{\dfrac{\Sigma(x-\mu)^2}{N}} = \sqrt{\dfrac{(4-6.9)^2 + (2-6.9)^2 + \cdots + (3-6.9)^2 + (3-6.9)^2}{12}}$

$= \sqrt{\dfrac{295.7}{14}} \approx \sqrt{21.12} \approx 4.6$

28. $\mu = \dfrac{\Sigma x}{N} = \dfrac{602}{9} \approx 66.9$

$\sigma = \sqrt{\dfrac{\Sigma(x-\mu)^2}{N}}$

$= \sqrt{\dfrac{(52-66.9)^2 + (86-66.9)^2 + \cdots + (68-66.9)^2 + (56-66.9)^2}{9}}$

$\approx \sqrt{\dfrac{862.87}{9}} \approx \sqrt{95.87} \approx 9.8$

29. $\bar{x} = \dfrac{\Sigma x}{n} = \dfrac{36{,}801}{15} = 2453.4$

$s = \sqrt{\dfrac{\Sigma(x-\bar{x})^2}{n-1}} = \sqrt{\dfrac{(2445-2453.4)^2 + \cdots + (2.377-2453.4)^2}{14}}$

$= \sqrt{\dfrac{1{,}311{,}783.6}{14}} \approx \sqrt{93{,}698.8} \approx 306.1$

30. $\bar{x} = \dfrac{\Sigma x}{n} = \dfrac{416{,}659}{8} = 52{,}082.4$

$s = \sqrt{\dfrac{\Sigma(x-\bar{x})^2}{n-1}} = \sqrt{\dfrac{(49{,}632-52{,}082.3)^2 + \cdots + (49{,}924-52{,}082.3)^2}{7}}$

$= \sqrt{\dfrac{73{,}225{,}929.87}{7}} = \sqrt{10{,}460{,}847.12} \approx 3234.3$

31. 99.7% of the distribution lies within 3 standard deviations of the mean.

$\mu + 3\sigma = 49 + (3)(2.50) = 41.5$

$\mu - 3\sigma = 49 - (3)(2.50) = 56.5$

99.7% of the distribution lies between \$41.50 and \$56.50.

32. $(46.75, 52.25) \rightarrow (49.50 - (1)(2.75), 49.50 + (1)(2.75)) \rightarrow (\mu - \sigma, \mu + \sigma)$

68% of the cable rates lie between \$46.75 and \$52.25.

33. $n = 40 \qquad \mu = 36 \qquad \sigma = 8$

$(20, 52) \rightarrow (36 - 2(8), 36 + 2(8)) \Longrightarrow (\mu - 2\sigma, \mu + 2\sigma) \Longrightarrow k = 2$

$$1 = \frac{1}{k^2} = 1 - \frac{1}{(2)^2} = 1 - \frac{1}{4} = 0.75$$

At least (40)(0.75) = 30 customers have a mean sale between \$20 and \$52.

34. $n = 20 \qquad \mu = 7 \qquad \sigma = 2$

$(3, 11) \rightarrow (7 - 2(2), 7 + 2(2)) \rightarrow (\mu - 2\sigma, \mu + 2\sigma) \rightarrow k = 2$

$$1 - \frac{1}{k^2} = 1 - \frac{1}{(2)^2} = 1 - \frac{1}{4} = 0.75$$

At least (20)(0.75) = 15 shuttle flights lasted between 3 days and 11 days.

35. $\bar{x} = \frac{\Sigma xf}{n} = \frac{99}{40} \approx 2.5$

$$s = \sqrt{\frac{\Sigma (x - \bar{x})^2 f}{n - 1}} = \sqrt{\frac{(0 - 1.24)^2(1) + (1 - 1.24)^2(8) + \cdots + (5 - 1.24)^2(3)}{39}}$$

$$= \sqrt{\frac{59.975}{39}} \approx 1.2$$

36. $\bar{x} = \frac{\Sigma xf}{n} = \frac{61}{25} \approx 2.4$

$$s = \sqrt{\frac{\Sigma(x - \bar{x})^2 f}{n - 1}}$$

$$= \sqrt{\frac{(0 - 2.44)^2(4) + (1 - 2.44)^2(5) + \cdots + (6 - 2.44)^2(1)}{24}}$$

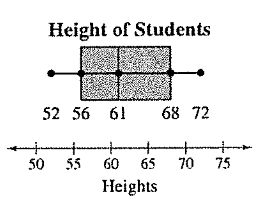
$$= \sqrt{\frac{72.16}{24}} \approx 1.7$$

37. $Q_1 = 56$ inches

38. $Q_3 = 68$ inches

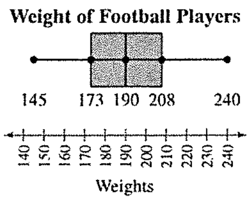
39. $\text{IQR} = Q_3 - Q_1 = 68 - 56 = 12$ inches

40.



41. $\text{IQR} = Q_3 - Q_1 = 33 - 29 = 4$

42.



43. 23% of the students scored higher than 68.

44. $\frac{84}{728} \approx 0.109 \rightarrow 11\%$ have larger audiences.

The station would represent the 89th percentile, P_{89}.

45. $x = 213 \Longrightarrow z = \frac{x - \mu}{\sigma} = \frac{213 - 186}{18} \approx 1.5$

This player is not unusual.

46. $x = 141 \Longrightarrow z = \frac{x - \mu}{\sigma} = \frac{141 - 186}{18} = -2.5$

This is an unusually light player.

47. $x = 178 \Longrightarrow z = \frac{x - \mu}{\sigma} = \frac{178 - 186}{18} = -0.44$

This player is not unusual.

48. $x = 249 \Longrightarrow z = \frac{x - \mu}{\sigma} = \frac{249 - 186}{18} \approx 3.5$

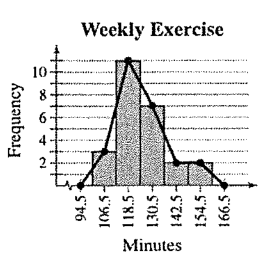
This is an unusually heavy player.

CHAPTER 2 QUIZ SOLUTIONS

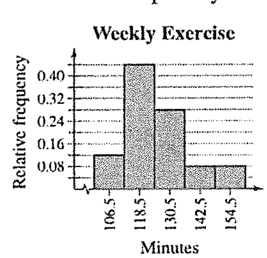
1. (a)

Class limits	Midpoint	Class boundaries	Frequency, f	Relative frequency	Cumulative frequency
101–112	106.5	100.5–112.5	3	0.12	3
113–124	118.5	112.5–124.5	11	0.44	14
125–136	130.5	124.5–136.5	7	0.28	21
137–148	142.5	136.5–148.5	2	0.08	23
149–160	154.5	148.5–160.5	2	0.08	25

(b) Frequency Histogram and Polygon



(c) Relative Frequency Histogram



(d) Skewed

Statistics 2.5 Review Name: KEY

Measures of Position Hour: Date:

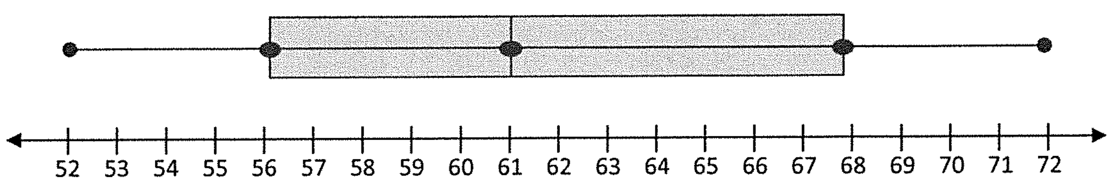
1) The heights (in inches) of students in a statistics class are given below.

52	54	55	56	56	56	58	59	60	61	61	63	65	67	68	68	70	71	72

a) Identify the 5-number summary (minimum, Q_1, Q_2, Q_3, maximum) 52, 56, 61, 68, and 72 (respectively)

b) Find the interquartile range (IQR) 68 - 56 = 12

c) Make a box-and-whisker plot of the data



2) The weights (in pounds) of the defensive players on a high school football team are given below.

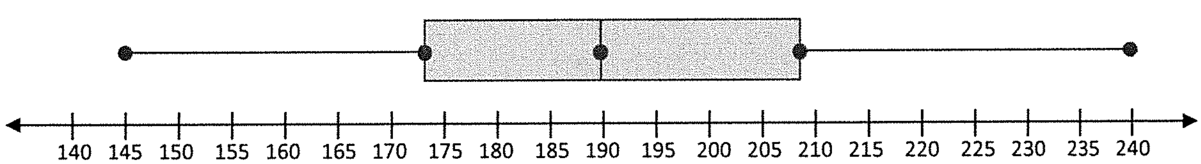
173	145	205	192	197	227	156	240	172	185	208	185	190	167	212	228	190	184	195

145	156	167	172	173	184	185	185	190	190	192	195	197	205	208	212	227	228	240

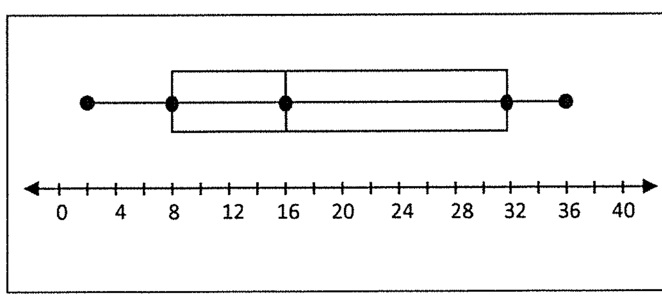
a) Identify the 5-number summary (minimum, Q_1, Q_2, Q_3, maximum) 145, 173, 190, 208, and 240

b) Find the interquartile range (IQR) 208 - 173 = 35

c) Make a box-and-whisker plot of the data



3) Using the box-and-whisker plot at the right,



a) Identify the value for the minimum 2

b) Identify the value for the first quartile, Q_1 8

c) Identify the value for the second quartile, Q_2 16

d) Identify the value for the third quartile, Q_3 32

e) Identify the value for the maximum 36

f) Find the interquartile range (IQR) 32 – 8 = 24

g) Approximately what percent of the data are between 8 and 32? 50%

h) Approximately what percent of the data are between 16 and 32? 25%

4) A student's test grade of 68 represents the 77th percentile of the grades. What percent of students scored higher than 68?

$100 - 77 = 23\%$

5) In 2007, there were 768 "oldies" radio stations in the United States. If one station finds that 84 stations have a larger daily audience than it has, what percentile does this station come closest to in the daily audience rankings?

$\frac{768-84}{768} = 0.89$ 89th percentile

6) A student's SAT score of 1230 is in the 8th decile for the students who took the SAT in 2017. What is the percentile for this score?

80th percentile

7) The 50th percentile is equivalent to which quartile?

Q_2

8) The weight of 10 high school football players have a bell-shaped distribution, with a mean of 186 pounds and a standard deviation of 18 pounds. Find the z-scores for each of the following weights of randomly selected football players. Determine which, if any, of these are unusual (or very unusual)..

a) 213 pounds 1.5

b) 141 pounds -2.5 *unusual*

c) 178 pounds -0.44

d) 249 pounds 3.5 *very unusual*

9) The mean price of new homes from a sample of houses is $155, 000 with a standard deviation of $15,000. The data set has a bell-shaped distribution. Find the z-scores for the following house prices, and use the z-scores to determine which, if any, of the following house prices is unusual (or very unusual).

a) $200,000 3 *very unusual*

b) $55,000 -6.67 *very unusual*

c) $175,000 1.33

d) $122,000 -2.2 *unusual*

10) What does a z-score of 0 indicate? *The score is the mean*

11) What does a negative z-score indicate? *The score is below the mean*

12) What does a positive z-score indicate? *The score is above the mean*

13) Between which standard deviations does a z-score of 1.5 occur? $+1\sigma$ to $+2\sigma$

14) Using a standard bell curve, what percent of scores lie between a z-score of -1.0 and 1.0? 68%