

Intro Stats Test A – Data Analysis – Part I – Key

Multiple Choice:

1. B 2. C 3. D 4. C 5. C 6. D 7. B 8. C 9. A 10. C

Open Ended:

11. Cats and Dogs

- Yes: 90.7% No: 9.3%
- Yes: 90.2% No: 9.8%
- segmented bar graph or pie charts
- No, there is a difference between the percents of those who like or don't like dogs, depending on whether they like cats. Of those who like cats, 90.2% like dogs; of those who don't like cats, 91.7% like dogs.

12. House Calls

- The table shows summary statistics for the past month. Fill in the table to find out the cost of the service calls.

Statistic	Hours of Service Call	Cost of Service Call
Mean	4.5	\$210
Median	3.5	\$170
SD	1.2	\$48
IQR	2.0	\$80
Minimum	0.5	\$50

- 1.50

13. Health Insurance

- Were any of the states outliers? Explain how you made your decision.

$$\text{IQR} = Q3 - Q1 = 16.7 - 10.8 = 5.9$$

$$1.5(\text{IQR}) = 1.5(5.9) = 8.85$$

$$Q3 + 1.5(\text{IQR}) = 16.7 + 8.85 = 25.55 < \text{Max}, \text{ so there is at least one high outlier}$$

$$Q1 - 1.5(\text{IQR}) = 10.8 - 8.85 = 1.95 < \text{Min}, \text{ so there are no low outliers}$$

- It is more appropriate to use the median and IQR to describe these data, since the data are skewed right.

14. Veterinary Costs

- a. Show plausible scale as \$20, \$40, \$60, \$80, \$100, \$120, \$140 with 68%, 95%, and 99.7% clearly indicated.

a. $z = \frac{125-80}{20} = 2.25$, so the chance of being 2.25 standard deviations or more

above average is $1 - 0.9878 = 0.0122$. A veterinary bill of \$125 is unusual.

- b. Q1 has $z = -0.67$ and Q3 has $z = +0.67$, so

$$-0.67 = \frac{y-80}{20} \Rightarrow y = 80 - 0.67(20) = 66.6 \text{ and}$$

$$+0.67 = \frac{y-80}{20} \Rightarrow y = 80 + 0.67(20) = 93.4. \text{ The IQR} = Q3 - Q1 = 93.4 - 66.6 =$$

\$26.80.

15. Soda Cans A machine that fills cans with soda fills according to a Normal model with mean 12.1 ounces and standard deviation 0.05 ounces.

a. $z = \frac{12-12.1}{0.05} = -2.0$, so the chance of being 2 standard deviations or more below

average is 0.0228. About 2.28% of cans are under-filled.

- b. A z-score of -2.33 has 1% to its left, meaning that 1% of the cans would be under-filled.

i. $-2.33 = \frac{12-12.1}{\sigma} \Rightarrow -2.33\sigma = -0.1 \Rightarrow \sigma = \frac{-0.1}{-2.33} = 0.043$ The standard deviation would need to be 0.043 ounces.

ii. $-2.33 = \frac{12-\mu}{0.05} \Rightarrow -2.33(0.05) = 12 - \mu \Rightarrow \mu = 12 + 2.33(0.05) = 12.12$ The mean would need to be 12.12 ounces.