

Time: 50 minutes

April 2, 2002

MATH 207
Quiz I

Solution

Second Semester, 01-02

- (10%) 1. Unaware that 35% of the 10,000 voters in his district still support him, a politician decides to estimate his political strength. A sample of 200 voters shows that 42% support him.
- Is the conclusion of the politician that 42% of the voters support him an example of inferential or descriptive statistics?
 - What is the population?
 - What is the value of the parameter of interest?
 - What is the value of the statistic of interest?

- (10%) 2. A business has 120 employees, each identified with an ID number with 3 digits 001,002,...,099,100,...,120. Explain clearly how you would choose a systematic sample of 10 employees out of the 120 employees.

- (27%) 3. The following data give the market value (in millions of U.S. dollars) in 1996, of 24 Canadian companies.

13,900	12,918	12,540	11,318	9729	8115
7493	7386	7045	7017	6806	6224
6008	5631	5473	5431	4864	4720
4693	4615	3979	3773	3704	3487

- Construct a grouped-data table including frequencies, relative frequencies and midpoints. Use classes of equal width starting with the class $3000 < 6000$ million.
 - Draw a relative frequency histogram for the data.
 - What percentage of the companies is worth 9 billion or more? (1 billion = 1000 million)
- (28%) 4. Following are the temperatures (in degrees Fahrenheit) observed during 8 wintry days in a certain city.

23 14 6 0 2 9 16 19

- Find the mean and the range of the data.
 - Find the variance and the standard deviation. (Use the computing formula).
 - Calculate the z-scores of the temperatures 16 and 2.
- (25%) 5. The following are the test scores of 12 students in a math class.

75 80 68 53 99 58 76 85 88 91 79 73

- Find the three quartiles.
- Find the Interquartile Range and interpret it.

✓

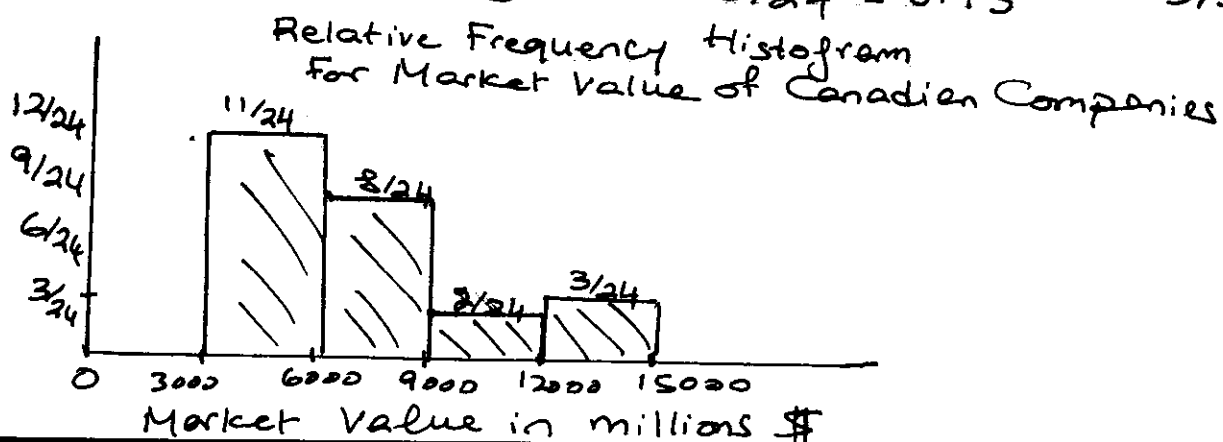
QUIZ I
Second Semester 01-02.

Solutions

1. (a) Inferential Statistics
 (b) The 10,000 voters in the district.
 (c) 35%.
 (d) 42%.
2. Divide 120 by sample number 10. Answer is 12. Take first 12 numbers in list: 1 → 12. Use random numbers ^{to} choose one number (randomly) from them. Call it n . Start with n as the first number in your sample and add 12 to it 9 times until you have 10 numbers. For example if $n = 7$, the 10 numbers will be:

7, 19, 31, 43, 55, 67, 79, 91, 103, 115

Class	Tally	Frequency	Rel. Frequency	Midpoint
3000 < 6000		11	$11/24 = 0.46$	4500
6000 < 9000		8	$8/24 = 0.33$	7500
9000 < 12000		2	$2/24 = 0.08$	10,500
12000 < 15000		3	$3/24 = 0.13$	13,500



4. a. mean $\bar{x} = \frac{\sum x}{8} = \frac{89}{8} = 11.125 \approx 11.13$

Range = biggest - smallest = $23 - 0 = 23$

b.

x	x ²
23	529
14	196
6	36
0	0
2	4
9	81
16	256
19	361

$$s^2 = \frac{\sum x^2 - \frac{(\sum x)^2}{8}}{7}$$

$$s^2 = \frac{1463 - \frac{7921}{8}}{7} = 67.5535$$

s² is variance.

S.D. $s = \sqrt{\text{variance}} = 8.22$

$\sum x = 89$ $\sum x^2 = 1463$

c. Standard Scores:

For $x = 16$, $z = \frac{16 - 11.13}{8.22} = 0.59$

For $x = 2$, $z = \frac{2 - 11.13}{8.22} = -1.11$

5. Numbers in ascending order:

53 58 68 73 75 76 79 80 85 88 91 99

Q₁

Q₂

Q₃

3.5th pos.

6.5th pos.

9.5th pos.

$$Q_2 = \frac{76+79}{2} = 77.5; \quad Q_1 = \frac{68+73}{2} = 70.5; \quad Q_3 = \frac{85+88}{2} = 86.5$$

$$IQR = Q_3 - Q_1 = 86.5 - 70.5 = 16$$

Interpretation: Middle 50% of data values lie within 16 units.

Boxplot:

