

QUANTITATIVE METHODS

Martin Huard

February 7, 2004

Assignment 6 SOLUTIONS

This assignment is due **Wednesday February 9, 2004** at the beginning of the class.

Question 1 (8 points)

A random sample of students were given a puzzle to solve in which they were timed. Here is a summary of the recorded times (in minutes).

Time (min)	Frequency	Midpoint x	xf	x^2f
0 - 9	7	4.5	31.5	141.75
10 - 19	23	14.5	333.5	4835.75
20 - 29	76	24.5	1862	45619
30 - 39	64	34.5	2208	76176
40 - 49	10	44.5	445	19802.5
	$\sum f = 180$		$\sum xf = 4880$	$\sum x^2f = 146575$

- a) Use this frequency distribution to estimate the mean age of those instructors surveyed.

$$\bar{x} = \frac{\sum xf}{n} = \frac{4880}{180} = 27.11 \text{ minutes}$$

- b) Use this frequency distribution to estimate the standard deviation of the ages of those instructors surveyed.

$$s^2 = \frac{\sum x^2f - \frac{(\sum xf)^2}{n}}{n-1} = \frac{146575 - \frac{4880^2}{180}}{180-1} = 79.74 \text{ minutes}^2$$

$$s = \sqrt{s^2} = \sqrt{79.74} = 8.93 \text{ minutes}$$

Question 2 (5 points)

The average speed for a random sample of cars passing on a certain portion of Highway 20 was 112 km/h with a standard deviation of 9 km/h.

- a) Use Chebyshev's theorem to find an interval centered about the mean for the speed of cars on Highway 20 in which you would expect at least 75% of the speeds to fall.

At least 75% of the data falls between $\bar{x} - 2s$ and $\bar{x} + 2s$

That is, between 94 km/h and 130 km/h.

- b) Use Chebyshev's theorem to find an interval centered about the mean for the speed of cars on Highway 20 in which you would expect at least 93.8% of the speeds to fall.

At least 93.8% of the data falls between $\bar{x} - 4s$ and $\bar{x} + 4s$

That is, between 76 km/h and 148 km/h.

Question 3 (12 points)

In a sociological study on college students, a random sample of 30 students was taken where each was asked to complete a test measuring a person's "well being". The range of possible scores was 20 to 100.

26	36	44	45	49	55	59	62	65	69
72	73	78	78	79	81	86	87	88	88
89	89	89	90	91	91	92	92	94	97

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

Min = 26

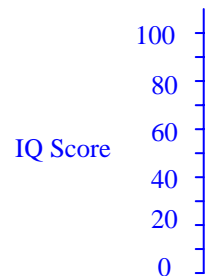
$Q_1 = 62$

Median = 80

$Q_3 = 89$

Max = 97

Scores on the "well being" test for
a sample of college students



- b) Find the interquartile range.

$$IQR = Q_3 - Q_1 = 89 - 62 = 27$$

- c) If Mary-Jane obtained a score of 81, into what quartile does this score fall?

Third Quartile