KFUPM
Mathematical Sciences

Term 051
STAT 319
Quiz #1

Date: 17/10/2005
Duration: 15 minutes

Name: ID#: Serial#: Section#: 5 6

Write neatly and eligibly

Q1: The accompanying data on single-leg power at a high workload.

244 191 160 187 180 176 174 205 211 183

For the above data;

1. find:

a. The mean

$$\bar{x} = \frac{\sum_{1}^{10} x}{10} = \frac{1911}{10} = \boxed{191.1}$$ (2)

b. The standard deviation

$$s = \sqrt{s^2} = \sqrt{\frac{\sum x^2 - n\bar{x}^2}{n-1}} = \sqrt{\frac{(370273) - (10)(191.1)^2}{9}} = 23.760$$ (2)

c. The lower quartile (1) 160 174 176 180 183 187 191 205 211 244 (1)

$Q_1 = P_{25} = ?$, (2) $R_{25} = \frac{1}{4}(11) = 2.75$ (1) $\Rightarrow i = 2$ & $d = 0.75$ (1)

$$Q_1 = P_{25} = x_{(i)} + d\,(x_{(i+1)} - x_{(i)}) = x_{(2)} + (0.75)(x_{(3)} - x_{(2)}) = 174 + (0.75)(176-174)$$
$$= \boxed{175.5}$$ (1)

d. If the z-score is defined as $z = \frac{x - \bar{x}}{s}$, then find the z-scores for the maximum observation.

$$z_{max} = \frac{244 - 191.1}{23.76} = 2.23$$ (1)

2. Construct a frequency table with class width 20, and starting at the minimum.

i	class	midpoint	f
1	[160-180)	170	3
2	[180-200)	190	4
3	[200-220)	210	2
4	[220-240)	230	0
5	[240-260)	250	1
Total	(1)		10 (1)

Q2: According to NASA, each space shuttle in the U.S. fleet has several "critical items" that could lead to catastrophic failure if broke down during flight. NASA estimates that the chance of at least one critical-item failure within the shuttle's main engines is about 0.016 for each mission. To build space station Freedom, NASA plans to fly eight independent shuttle missions a year during the reminder of the 1990s. Find the probability that at least one of the eight shuttle flights scheduled results in a critical-item failure.

$P(F) = 0.016$, F: at least one item fails. , $S = F'$

$P(\geq 1F) = 1 - P(0F) = 1 - P(8F')$ ①

$= 1 - [P(S_1)P(S_2)\cdots P(S_8)]$ by independence ①

$= 1 - P^8(S) = 1 - (0.984)^8$ ①

$= 1 - 0.879 = \boxed{0.121}$ ①

With My Best Wishes