ECO251 QBA1
FIRST HOUR EXAM
February 18, 2005

Name: _____KEY_____
Student Number : _____
Class Hour: _____

Remember – Neatness, or at least legibility, counts. In most non-multiple-choice questions an answer needs a calculation or short explanation to count.

Part I. (7 points)
(Source: Prem S. Mann) The following numbers represent the price earnings ratio of 12 corporations.
7, 16, 18, 18, 22, 20, 20, 19, 31, 34, 38, 58

Compute the following:
a) The Median (1)
b) The Standard Deviation (3)
c) The 61st percentile (2)
d) The Coefficient of variation (1)

Solution: The numbers in order are 7, 16, 18, 18, 19, 20, 20, 22, 31, 34, 38, 58. $n = 12$.

	x	x^2
x_1	7	49
x_2	16	256
x_3	18	324
x_4	18	324
x_5	19	361
x_6	20	400
x_7	20	400
x_8	22	484
x_9	31	961
x_{10}	34	1156
x_{11}	38	1444
x_{12}	58	3364
Total	301	9523

a) $p(n+1) = .5(13) = 65$ The middle numbers are the 6th and 7th number, which are both 20. $x_{.50} = \frac{x_7 + x_8}{2} = 20.$

b) $\bar{x} = \frac{\sum x}{n} = \frac{301}{12} = 25.0833,$

$s^2 = \frac{\sum x^2 - n\bar{x}^2}{n-1} = \frac{9523 - 12(25.0833)^2}{12-1}$

$= \frac{1972.9367}{11} = 179.3579$. So

$s = \sqrt{179.3579} = 13.392$

c) $p(n+1) = .61(13) = 7.93$. So $a = 7$ and $b = 0.93$

$x_{1-p} = x_a + b(x_{a+1} - x_a)$ so

$x_{1-.61} = x_{.39} = x_7 + 0.93(x_8 - x_7)$

$= 20 + 0.93(22 - 20) = 21.86$

d) $C = \frac{s}{\bar{x}} = \frac{13.392}{25.0833} = 0.5339$ or 53.39%

How mean and variance were checked. The numbers were put into c1.

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Welcome to Minitab, press F1 for help.

MTB > let c2=c1*c1
MTB > sum c1

Sum of x

Sum of x = 301

MTB > sum c2

Sum of xsq

Sum of xsq = 9523

MTB > describe c1;
SUBC> mean;
SUBC> variance;
SUBC> stdev.
Descriptive Statistics: x
Variable   Mean  StDev  Variance
x         25.08  13.39    179.36

MTB > print c1 c2
Data Display
Row    x   xsq
  1    7    49
  2   16   256
  3   18   324
  4   18   324
  5   19   361
  6   20   400
  7   20   400
  8   22   484
  9   31   961
 10   34  1156
 11   38  1444
 12   58  3364
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Part II. (At least 35 points – 2 points each unless marked - Parentheses give points on individual questions. Brackets give cumulative point total.)

1. I have the average time of the first 10 runners in the Boston Marathon.
   a) Is this a parameter or a statistic? (Think!)
   b) What symbol should you use to indicate this mean? [2]

   Answer: This is a parameter, since the first 10 runners are a population – we have all of them. The symbol for a population mean is $mu = \mu$.

2. The data in question 1 is an example of
   a) Ordinal Data
   b) Nominal Data
   c) Discrete ratio data
   d) Continuous interval data
   e) *None of the above. [4]

   Answer:
   They are none of the above. Both the times of the runners and their average are continuous ratio data.

3. Assume now that I have the times of all the runners who finish the Boston Marathon and that the first ten or 20 runners have times that are far below most of the rest, but that the more typical runners are relatively close together. Which of the following is most likely?
   a) *mean < median < mode
   b) mean < mode < median
   c) mode < mean < median
   d) mode < median < mean
   e) none of the above. [6]

   Answer: The description (which might be highly inaccurate) is of a data set that is skewed to the left. The mean is the least robust of the measures of central tendency, so it will be pulled furthest to the right. The mode is the most robust and will hold its ground. The median is generally between them.

4. Mark the variables below as qualitative (A) or quantitative (B)
   a) Celsius Temperature
   b) Absolute Temperature
   c) Cost of a new thermometer
   d) The number of thermometers you have in your house. [8]

   Answer: All of these variables are quantitative (B). The first is continuous interval data, the second and third are usually considered continuous ratio data and the last is discrete ratio data.

5. Which of the following is not a dimension – free measurement.
   a) *The population variance.
   b) Pearson's measure of skewness
   c) g_1
   d) The coefficient of variation.
   e) The coefficient of excess.
   f) All of the above are dimension free
   g) None of the above are dimension free. [10]

   Explanation: b – e are dimension-free ratios because they have data that are measured in the same units in their numerators and denominators.

6. Classify a deck of cards as follows: Write yes or no in each location.

   A_1 Hearts; A_2 Red cards; A_3 Black cards; A_4 Face cards (4)

	Mutually Exclusive?	Collectively Exhaustive?
A_1 and A_2	__no__	__no__