

**ECO251 QBA1  
FIRST EXAM  
February 21, 2008  
TAKE HOME SECTION**

Name: \_\_\_\_\_  
Student Number: \_\_\_\_\_

Throughout this exam **show your work!** Please indicate clearly what sections of the problem you are answering and what formulas you are using. Turn this in with your in-class exam.

Part III. Do all the Following (12+ Points). The problems are based on problems by Doane and Seward. **Show your work!**

1. The table below represents the distribution of winning times in seconds for horses in the Kentucky Derby. Treat these data as a sample. Personalize the data below by adding the last two digits of your student number to the last 2 frequencies. Add one digit per frequency. For example, Seymour Butz's student number is 876509 so he adds 0 to the second-to-last frequency and 9 to the last frequency and uses {1, 5, 16, 22, 12, 8, 5, 3 and 11} (adding to 83). You may check your work on the computer, but what is turned in should look as if it had all been done by hand.

Row	Time in seconds	Frequency
1	119 to under 120	1
2	120 to under 121	5
3	121 to under 122	16
4	122 to under 123	22
5	123 to under 124	12
6	124 to under 125	8
7	125 to under 126	5
8	126 to under 127	3
9	127 to under 128	2

- a. Calculate the Cumulative Frequency (0.5)
- b. Calculate the Mean (0.5)
- c. Calculate the Median (1)
- d. Calculate the Mode (0.5)
- e. Calculate the Variance (1.5)
- f. Calculate the Standard Deviation (1)
- g. Calculate the Interquartile Range (1.5)
- h. Calculate a Statistic showing Skewness and interpret it (1.5)
- i. Make an ogive of the data (Neatness Counts!) (1)

j. Extra credit: Put a (horizontal) box plot below the ogive using the same horizontal scale (1)

k. (Extra, extra credit) the trimmed mean is a measure of the data that mitigates the effect of extreme values. A 5% trimmed mean is a mean calculated after 5% of the data is removed from both the top and bottom of the data. (For example, if there are 100 points, the top 5 and the bottom 5 are removed and the mean of the middle 90 points is calculated.) Try to calculate a 5% trimmed mean of your Kentucky Derby numbers. (1)

l. (More extra credit) Davies' test: In 1929 Professor George Davies tried to find a method that would tell us whether an arithmetic mean or a geometric mean was a better way to characterize a set of data. Davies

recommended using  $D = \frac{(\log(Q1) + \log(Q3)) - 2\log(x_{.50})}{\log(Q3) - \log(Q1)}$ . We should decide to use the geometric

mean if

( $\alpha$ )  $D \leq 0.20$ . ( $\beta$ ) The data seems to be convincingly skewed to the right. ( $\gamma$ ) There are at least 50 observations.

- (i) Using the Derby data compute  $D$  and make a recommendation with an explanation.
- (ii) See if you can compute a geometric mean for this grouped data. Be sure that you explain what you do so that I can follow it.

2. The sales of your firm over the last 5 years are as follows.

Year	Sales (\$millions)
1	131
2	227
3	311
4	354
5	403

Personalize these data by subtracting the last two digits of your student number from the first sales figure. For example, Ima Badrisk's student number is 876519, so she subtracts 19 from 131 to get 112. The effect of this will be to raise the growth rates in a). Do the following (3)

- Find the average growth rate of sales by taking a geometric mean using the four year-to-year growth rates.
- Find the harmonic mean of your sales numbers.
- Find the root-mean-square of your sales numbers.
- (Extra credit) Compute the geometric mean from a) using natural and/or base 10 logarithms. (1 point extra credit each).