251y0312 9/26/03

ECO251 QBA1
FIRST HOUR EXAM
October 1, 2003

Name: _____KEY_____
Social Security Number: _____

Part I. (32 points)

1. The process of using sample statistics to draw conclusions about true population parameters is called
   a) *statistical inference.
   b) the scientific method.
   c) sampling.
   d) descriptive statistics.

2. A summary measure that is computed to describe a characteristic of an entire population is called
   a) *a parameter.
   b) a census.
   c) a statistic.
   d) the scientific method.

3. Which of the following is a discrete quantitative variable?
   a) the Dow Jones Industrial Average
   b) the volume of water released from a dam
   c) the distance you drove yesterday
   d) *the number of employees of an insurance company

TABLE 1-1
The manager of the customer service division of a major consumer electronics company is interested in determining whether the customers who have purchased a videocassette recorder made by the company over the past 12 months are satisfied with their products.

4. Referring to Table 1-1, the possible responses to the question "Are you happy, indifferent, or unhappy with the performance per dollar spent on the videocassette recorder?, " if we write down a 1 for 'happy, ' a 2 for 'unhappy' and a 3 for 'indifferent, are the following kind of random variable.
   a) ratio
   b) *nominal
   c) interval
   d) ordinal

TABLE 2-2
At a meeting of information systems officers for regional offices of a national company, a survey was taken to determine the number of employees the officers supervise in the operation of their departments, where X is the number of employees overseen by each information systems officer.

X	f
1	7
2	5
3	11
4	8
5	9

5. Referring to Table 2-2, how many regional offices are represented in the survey results?
   a) 127
   b) 5
   c) 15
   d) *40 $n = \sum f$

TABLE 2-5
The following are the durations (in minutes) of a sample of long-distance phone calls made within the continental United States, reported by one long-distance carrier:

Time (in Minutes)	Relative Frequency
0 but less than 5	0.37
5 but less than 10	0.22
10 but less than 15	0.15
15 but less than 20	0.10
20 but less than 25	0.07
25 but less than 30	0.07
30 but less than 35	0.02

6. Referring to Table 2-5, if 1,000 calls were randomly sampled, how many calls lasted under 10 minutes?
   a) 220
   b) 370
   c) 410
   d) *590
   The answer is the cumulative frequency for the 2nd class multiplied by 1000.

class	f_{rel}	F_{rel}
0 but less than 5	0.37	0.37
5 but less than 10	0.22	0.59
10 but less than 15	0.15	0.74
15 but less than 20	0.10	0.84
20 but less than 25	0.07	0.91
25 but less than 30	0.07	0.98
30 but less than 35	0.02	1.00

7. If I make a graph of the data in table 2-5 (Assume the table represents a sample of 1000 calls) with the following x and y coordinates for the first five points: {(0, 0), (5, 370), (10, 590), (15, 740) , (20, 840)}, a one-word name for this type of graph is _ogive_ , and the last point on the line could be (45, _1000_) **Explanation:** The x points are the upper limits of the class, starting at the last empty class. The y points are the cumulative frequencies, gotten by multiplying the F_{rel} column by 1000. When the graph gets to x = 35, y hits 1000 and is 1000 for all subsequent points.

8. Referring to Table 2-5, what is F_{rel} for the percentage of calls that lasted under 20 minutes?
   a) 0.10
   b) 0.76
   c) *0.84 Look at the table.
   d) None of the above – write in the correct answer.

TABLE 2-7
The stem-and-leaf display below contains data on the number of months between the date a civil suit is filed and when the case is actually adjudicated for 50 cases heard in superior court.

Stem	Leaves
1	2 3 4 4 4 7 8 9 9
2	2 2 2 2 3 4 5 5 6 7 8 8 8 9
3	0 0 1 1 1 3 5 7 7 8
4	0 2 3 4 5 5 7 9
5	1 1 2 4 6 6
6	1 5 8

9. Referring to Table 2-7, the civil suit with the fourth shortest waiting time between when the suit was filed and when it was adjudicated had a wait of __14__ months. **Explanation:** The first four numbers are 12, 13, 14, 14.

10. Eunice computes the following statistics from a sample $\frac{n}{(n-1)(n-2)}\sum(x-\bar{x})^3$, $\frac{k_3}{s^3}$,

$\frac{\sum(x-\bar{x})^2}{n-1}$, $\frac{3(mean-mode)}{std.deviation}$, $k_4=\frac{n^2}{(n-1)(n-2)(n-3)}\left[(n+1)\frac{\sum(x-\bar{x})^4}{n}-\frac{3(n-1)^3s^4}{n^2}\right]$.

She thinks the sample represents a population that is skewed to the right. Which of the statistics would show skewness and what sign should she expect from them? (No partial credit on this one.)
Answer: Any legitimate measure of skewness would be positive if the population is skewed to the right. From your formula table, the measures of skewness are: (i) $k_3=\frac{n}{(n-1)(n-2)}\sum(x-\bar{x})^3$ - skewness, (ii) $g_1=\frac{k_3}{s^3}$ - relative skewness and (iii) $SK=\frac{3(mean-mode)}{std.deviation}$ - Pearson's measure of skewness.

The other two are $s^2=\frac{\sum(x-\bar{x})^2}{n-1}$ - the sample variance, which is always positive and measures dispersion and $k_4=\frac{n^2}{(n-1)(n-2)(n-3)}\left[(n+1)\frac{\sum(x-\bar{x})^4}{n}-\frac{3(n-1)^3s^4}{n^2}\right]$ - the coefficient of excess (in the outline), which measures kurtosis.

11. In a perfectly symmetrical distribution with one mode.
   a) the arithmetic mean equals the median.
   b) the median equals the mode.
   c) the arithmetic mean equals the mode.
   d) *all of the above.
   e) none of the above.