HAIGAZIAN UNIVERSITY
FACULTY OF BUSINESS ADMINISTRATION AND ECONOMICS
ECO 231 – ECONOMIC STATISTICS I
QUIZ 2 - SPRING 2007-2008

NAME: ID:

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TIME: 1HOUR 30 MINUTES

INSTRUCTIONS: PLEASE WRITE YOUR NAME AND ID NUMBER AND TICK THE SECTION TO WHICH YOU BELONG.
ANYONE CAUGHT **CHEATING** WILL AUTOMATICALLY GET HIS COPY REMOVED AND WILL GET **ZERO**.
This exam consists of 16 pages, including 4 problems, 14 multiple choice questions. Check that none are missing. Answer the questions in the space provided for each problem; if more space is needed, you may use the back pages. Rough work can be done on the back pages. To receive full credits, you have to justify your answers.
GOOD LUCK!

QUESTION		GRADE
PART I: 1.	15 %	
2.	23 %	
3.	9 %	
4.	11 %	
PART II: 5 - 18	42 %	
TOTAL	100 %	

PART I: SOLVE THE FOLLOWING 5 EXERCISES IN THE SPACE PROVIDID

1. Given the following frequency distribution **no comments needed**,

Salaries	Frequency	C.F
[0,1000[	530	530
[1000, 2000[	70	600
[2000, 3000[	140	740
[3000, 4000[	65	805
[4000, 5000[	195	1000

Quantitative / continues / Ratio $n = 1000$

a. Find the first five quartiles:

Q_1: Location : $(n) \times 0.25 = 250.00$

$$Q_1 = L_{Q_1} + \left(\frac{(n \times 0.25) - C.f_{pc}}{f_{Q_1}}\right) \times i = 0 + \left(\frac{250 - 0}{530}\right) \times 1000 = 471.69 \text{ unit of sal}$$

Q_2: Location : $\frac{n}{2} = 500$

$$Q_2 = L_{Q_2} + \left(\frac{n/2 - C.f_{pc}}{f_{Q_2}}\right) + C = 0 + \left(\frac{500 - 0}{530}\right) \times 1000 = 943. \text{ units of sal}$$

Q_3: Location : $(n \times 0.75) = 750$

$$Q_3 = L_{Q_3} + \left(\frac{(n \times 0.75) - C.f_{pc}}{f_{Q_3}}\right) + i = 3000 + \left(\frac{750 - 740}{65}\right) \times 100 = 3153.846 \text{ unit of salary}$$

Q_4: Q_4 = Highest value = 530 units of salary.

5,000

-1

Q_5:

-1

b. Find the first five deciles:

D_1: Location: $\frac{n}{10} = 100$

$$D_1 = L_{D_1} + \left(\frac{n/10 - C.F_{PC}}{f_{D_1}}\right) \times i = 0 + \left(\frac{100 - 0}{530}\right) \times 1000 = 188.6$$ units of sal

D_2: Location: $\frac{2n}{10} = 200$

$$D_2 = L_{D_2} + \left(\frac{2n/10 - C.F_{PC}}{f_{D_2}}\right) \times i = 0 + \left(\frac{200 - 0}{530}\right) \times 1000 = 377.$$ units of sa

D_3: Location: $\frac{3n}{10} = 300$

$$D_3 = L_{D_3} + \left(\frac{3n/10 - C.f_{PC}}{f_{D_3}}\right) \times i = 0 + \left(\frac{300 - 0}{530}\right) \times 1000 = 566.$$ units of sal

D_4: Location: $\frac{4n}{10} = 400$

$$D_4 = L_{D_4} + \left(\frac{4n/10 - C.f_{PC}}{f_{D_4}}\right) \times i = 0 + \left(\frac{400 - 0}{530}\right) \times 1000 = 754$$ units. sa

D_5: Location: $\frac{5n}{10} = 500$

$D_5 = Q_2 = 943.396$ units of salary.

c. Find the first five percentiles:

P_1: $P_1 \uparrow$ location $= \frac{n}{100} = 10$

$$P_1 = L_{P_1} + \left(\frac{n/100 - C.f_{PC}}{f_{P_1}}\right) \times 1000 = 0 + \left(\frac{10 - 0}{530}\right) \times 1000 = 18.867 \text{ units of salary}$$

P_2: location $= \uparrow \frac{2n}{100} = 20$

$$P_2 = L_{P_2} + \left(\frac{2n/100 - C.f_{PC}}{f_{P_2}}\right) \times i = 0 + \left(\frac{20 - 0}{530}\right) \times 1000 = 37.735 \text{ units of salary}$$

P_3: location $= \frac{3n}{100} = 30$

$$P_3 = L_{P_3} + \left(\frac{3n/100 - C.f_{PC}}{f_{P_3}}\right) \times i = 0 + \left(\frac{30 - 0}{530}\right) \times 1000 = 56.6 \text{ units of salary}$$

P_4: location $= \frac{4n}{100} = 40$

$$P_4 = L_{P_4} + \left(\frac{4n/100 - C.f_{PC}}{f_{P_4}}\right) \times i = 0 + \left(\frac{40 - 0}{530}\right) \times 1000 = 75 \text{ units of salary}$$

P_5: location $= \frac{5n}{100} = 50$

$$P_5 = L_{P_5} + \left(\frac{5n/100 - C.f_{PC}}{f_{P_5}}\right) \times i = 0 + \left(\frac{50 - 0}{530}\right) \times 1000 = 94.339 \text{ units of salary.}$$

Quantitative / continues collected as descrete / Ratio.

2. The following data represent exam grades obtained by 30 students in a statistics class:

15

17	25	37	31	47	49	56	51
55	60	66	67	72	71	76	70
70	70	78	84	85	83	80	86
93	91	98	100	100	100		

a. Show the data in a stem and leaf.

Stem	leaf
1	7
2	5
3	1 7
4	7 9
5	1 5 6
6	0 6 7
7	0 0 0 1 2 6 8
8	0 3 4 5
9	1 3 6 8
10	0 0 0

n = 30.

b. Construct a box plot.(Show all the information needed)

Q_1: Location: $(n+1) \times 0.25 = 7.75$

$Q_1 = 51 + (55 - 51) \times 0.75 = 54$ g.p

Q_2: Location: $\frac{(n+1)}{2} = 15.5$

$Q_2 = \frac{70 + 71}{2} = 70.5$ g.p.

Q_3: Location: $(n+1) \times 0.75 = 23.25$

$Q_3 = 85 + (91 - 85) \times 0.25 = 86.5$ g.p

$IQR = Q_3 - Q_1 = 32.5$ g.p.

Continue on the next page to draw the box plot.

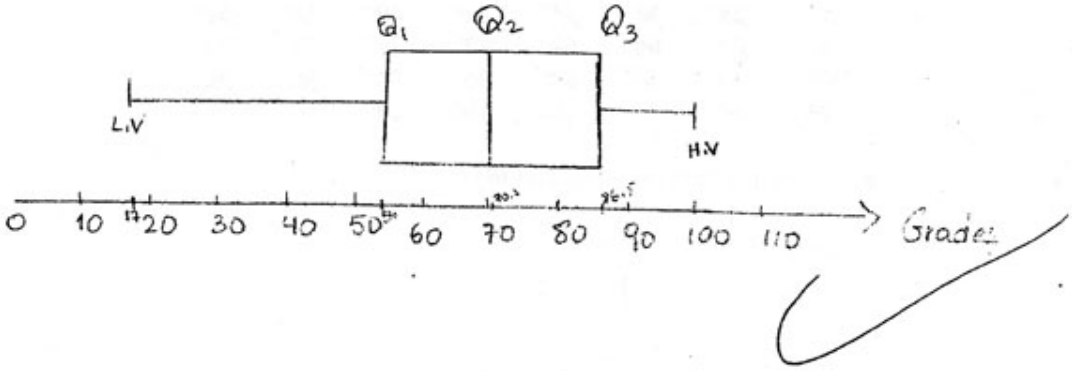
Lower outlier: $Q_1 - 1.5(IQR) = 5.25$ g.p.

L.V = 17 $\Rightarrow$ No Lower outlier.

Upper outlier: $Q_3 + 1.5(IQR) = 135.25$

H.V = 100 $\Rightarrow$ No UPPER OUTLIER

Continuation of 2b.



c. Comment on the box plot.

$Q_3 - Q_2$ vs $Q_2 - Q_1$

$86.5 - 70.5$ $\quad$ $70.5 - 54$

16 $\quad$ 16.5 $\Rightarrow$ skewed to the left

$C.S.K = \frac{3(\text{Mean} - \text{Median})}{S}$

$= \frac{3(69.26 - 70.5)}{22.916} = -0.162$

$\Rightarrow$ skewed to the left

-ve skewness (negative)

this does not come from the box plot

~~C.S.K > 1~~

Range $= 100 - 17 = 83$ g.p.

Most of the students' grades is ranging over 83 g.p.

IQR = 32.5 g.p.

The middle 50% of the grades of the students is ranging over ~~3.2~~ 32.5 g.p.

d. Find the following (no comment needed for this part d):

- The 7th decile

Location : $\frac{7(n+1)}{10} = 21.7$

$D_7 = 83 + (84 - 83) \times 0.7 = 83.7$ g.p.

- The 3rd percentile

Location : $\frac{3(n+1)}{100} = 0.93$

$P_3 =$? F

- The 28th percentile

Location: $\frac{28(n+1)}{100} = 8.68$

$P_{28} = 55 + (56 - 55) \times 0.68 = 55.68$ g.p.

- The 4th decile

Location : $\frac{4(n+1)}{10} = 12.4$

$D_4 = 67 + (70 - 67) \times 0.4 = 68.2$ g.p.

- The 85th percentile

Location : $\frac{85(n+1)}{100} = 26.35$

$P_{85} = 96 + (98 - 96) \times 0.35 = 96.7$ g.p.

e. Find the coefficients of skewness and variation.

$$\text{C.S.K} = \text{coef of skewness} = \frac{3(\text{Mean} - \text{Median})}{S} = \frac{3(69.26 - 70.5)}{22.916} = -0.162$$

$$\text{C.O.variation} = \frac{S}{\bar{X}} = \frac{22.916}{69.26} = 0.330 \text{ s.f.} \times 100$$

$= 33.08\%$

interp.

f. Compare your comments on the box plot with your results in part e (just above)

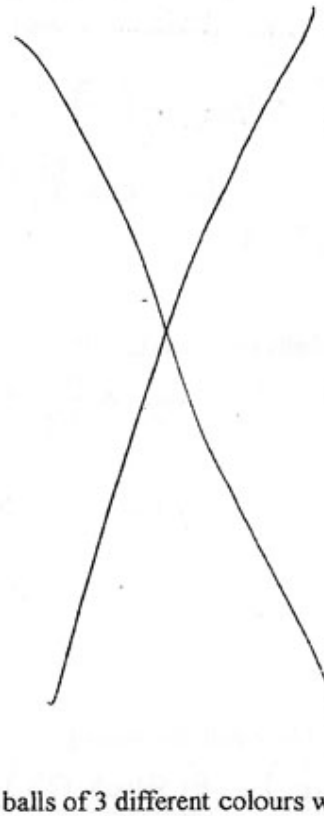
?

g. Construct a frequency table using **9** equal sized class intervals. Start with a lower class limit of **15** for the first class.

?

h. For this grouped data calculate the central tendency measures.

- Mode
- Mean
- Median



RBW

3. An urn contains 30 balls of 3 different colours with the letters A, B, and C. Following is a table showing their distribution.

	A	B	C	Marginal
Red	6	5	2	13
Black	4	2	1	7
White	2	1	7	10
Marginal	12	8	10	30

We are picking 3 balls from the urn (one after the other without replacing). Find the probability of each of the following events **(no comment needed)**:

a. "Obtaining a red ball followed by a black ball then by a white ball."

$P(R \text{ follow } B \text{ follow } W) = \frac{13}{30} \times \frac{7}{29} \times \frac{10}{28} = \frac{13}{348} = 0.03$

RBW
RWB $\frac{13}{30} \times \frac{10}{29} \times \frac{7}{28}$
BRW $\frac{7}{30} \times \frac{13}{29} \times \frac{10}{28}$
WRB $\frac{10}{30} \times \frac{13}{29} \times \frac{7}{28}$
WBR $\frac{10}{30} \times \frac{7}{29} \times \frac{13}{28}$
BWR

0,0373

$\frac{6}{12} \times$

$P(R/A) = \frac{\frac{6}{30}}{\frac{12}{20}}$ $\frac{7}{30} \times \frac{10}{29} \times \frac{13}{28}$ $\frac{6}{30} \times 3$

b. "Obtaining 3 balls with different colours."

$P(\text{3 balls with different colors}) =$

$\left(\frac{13}{30} \times \frac{7}{29} \times \frac{10}{28}\right) + \left(\frac{7}{30} \times \frac{13}{29} \times \frac{10}{28}\right) + \left(\frac{10}{30} \times \frac{7}{29} \times \frac{13}{28}\right)$

$\frac{13}{30} \times \frac{10}{29} \times \frac{7}{28}$ you still have 3 other formats!

$\propto \propto \propto$ $-\frac{1}{2}$

c. "Obtaining 2 red balls and 1 white ball."

$P(2R \cap 1W) = \frac{13}{30} \times \frac{12}{29} \times \frac{10}{28} = \frac{13}{203} = 0.0640$

$\times 3$

-1

d. "Obtaining only a black with the letter B."

$P(Black/B) = \frac{P(Black \cap B)}{P(B)} = \frac{2}{8} = 0.25$

$\frac{C_1^2 \cdot C_2^{28}}{C_3^{30}}$ $\frac{2}{30} \times \frac{28}{29} \times \frac{27}{28} \times 3$

-2

e. "Obtaining 3 red balls knowing that the balls have the letter A on them."

$P(3Red/A) = \frac{6}{12} \times \frac{5}{11} \times \frac{4}{10} = \frac{1}{11} = 0.090$

4. There are 600 employees at the Tuesday Morning's Department Store corporate headquarters in Columbia.

a. Construct a contingency table using the following information:

- 45% of them are male,
- 500 of them have attended college,
- 60 females have not attended college.

0/2

Male / Attended college	Male	Female	Marginal
A			
$\bar{A}$		60	
Marginal	45%	55%	100%

3rd thing please

These are in %

Gen / Att	M	F	Marginal
A	230	270	500
$\bar{A}$	40	60	100
Marginal	270	330	600

An employee is selected at random **(no comments needed for b, c and d only)**

b. What is the probability the employee is female?

$P(F) = \frac{330}{600} = 0.55$

c. What is the probability the employee is either female or attended college?

$P(F \text{ or } A) = \cancel{P(F \cap A)}$ $\frac{330}{600} + \frac{500}{600} - \left(\frac{270}{600}\right) = 0.983$

d. What is the probability the employee attends college given a female employee?

$$P(A/F) = \frac{P(A \cap F)}{P(F)} = \frac{\frac{270}{600}}{\frac{330}{600}} = 0.81$$

$$P(A \cap F) = P(F) \times P(A/F)$$

e. Are the events female and attending college independent? **(Explain)**

$P(A/F) = 0.81$

$P(A) = 0.83$

? it is not independent.

PART II: Please circle the best answer or answers for the following 15 Multiple Choice Questions.

5. Anderson and Company purchase electric motors from two suppliers. Sixty percent are purchased from Hall Electric and the rest from Harmon Products. The quality level at Hall Electronic is a better than for Harmon Products. Five percent of the motors purchased from Hall Electronics are defective, whereas on eight percent from Harmon Products are defective. An electric motor was selected at random and found to be defective. What is the probability it was purchased from Harmon Products?

- o 0.0300
- o 0.0320
- o 0.0800
- o 0.4000
- ◎ 0.5161
- o None of the above

6. There are many flights from Houston to Little Rock, AK each day. The data below shows the number of minutes a flight was late (or early) in arriving in Little Rock for a sample of 5 flights. To explain, a positive number means the flight was late, a value of 0 indicates it arrived on time, and a negative number indicates it was early. So the first flight was 4 minutes late and the last flight 10 minutes early.

4 12 -9 6 -10

What is the third quartile?

- o 2
- o -2
- o -9
- ◎ 9
- o Can not be determined
- o None of the above

7. Ms Najoie and Ms Joumana need to pick a student each, to help them in a project presentation. Eight students were free and volunteered to help them. What is the different set of students that could be selected?

- o 16
- o 20
- ⊗ 28
- o 56
- o 20160
- ◎ None of the above

8. In the experiment of tossing a fair coin three times. What is the probability that at least one heads will occur?

- o 0.5
- o 1
- ◎ 0.875
- o 0.125
- o 0.375
- o None of the above

9. Suppose D and E are events where P (D) = 0.5, P (E) = 0.3 and P (E / D) = 0.4. What is P (D or E) = ?

- 0.1
- 0.2
- 0.4
- 0.5
- (◎) 0.6
- None of the above

10. One card is to be drawn at random from a standard deck of cards. What is the probability of selecting a king or a card a red suit (red card).

- 0.0385
- 0.0015
- 0.5
- 0.5769
- (◎) 0.5385
- None of the above

11. What is ${}_AC_2$ = ?

- A!
- (A-2)!
- (◎) $(A^2 - A) / 2$
- A.(A - 1).(A - 2)
- A.(A - 1)
- A.(A - 1).(A - 2) / 2

12. Given the following frequency distribution for the measurements (in mm) of 69 roaches collected in a trap:

Length (in mm)	Frequency	C.F
[1, 4[2.5	1	1
[4, 7[5.5	6	7
[7, 10[8.5	11	18
[10, 13[11.5	23	41
[13, 16[14.5	16	57
[16, 19[17.5	7	64
[19, 22[20.5	4	68
[22, 25[23.5	1	69
	69	

What is the mean, median and mode respectively?

- 12.37, 10, 23
- 4.21, 11.5, 11.5
- 8.625, 12, 23
- 12.37, 11.5, 23
- (◎) 12.37, 11.5, (11.5)
- 8.625, 11.5, 11.5

13. Using the frequency distribution of question 12 just above. What is the range and variance respectively?

- (◎) 24, 17.76
- 25, 4.21
- 69, 4.18
- 24, 17.5
- 25, 4.21
- 24, 4.21

14. Suppose that F and G are events where P (F) = 0.25, P (G) = 0.45 and P (F or G) = 0.55. What is P (F and G) = ?

- 0.10
- 0.15
- 0.25
- 0.35
- 0.70
- None of the above

15. A single die is rolled four times. What is the probability of getting no 3s?

- 1 / 6
- 5 / 6
- $(1/6)^4$
- $1-(1/6)^4$
- $(5/6)^4$
- None of the above

16. A single die is rolled four times. What is the probability that the four rolls will result in the same outcome each time?

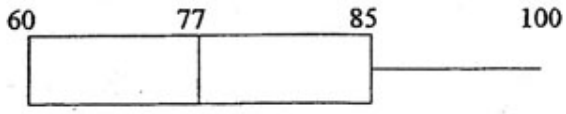
- 0.6667
- $7.716 * 10^{-4}$
- $4.63 * 10^{-3}$
- 1
- 0
- None of the above

17. A lecturer of a statistic class after organizing the grades of his students from lowest to highest drew a box plot to represent his data. But for some reason when printing the information some of the data and the box plot were missing. The box plot showing started at the 1st quartile and stopped at the maximum.

Here is what he got from the printing:

20, 30, 35, …, 78, 79, 80, 81, 85, 85, 90, 94, 99, 100.

Box plot (not scaled)



It is clear that $Q_1 = 60$, $Q_2 = 77$, $Q_3 = 85$ and the maximum = 100. Give in order the lowest outlier, the minimum and the highest outlier.

- No outlier, 20, no outlier
- 20, 30, no outlier
- 20, 22.5, 122.5
- 20, 22.5, no outlier
- No outlier, 20, 122.5
- None of the above

18. Let P = {A, B, C, D} and Q = {0, 2, 4, 6, 8}. What is the number of license plates consisting of three letters from P followed by two numbers from Q such that the letter B appears at least once? (Note that repetition is allowed only for the letters)

- 480
- 1280
- 925
- 540
- 740
- None of the above

$\frac{3}{P}\ \frac{3}{P}\ \frac{3}{P}\ \frac{5}{Q}\ \frac{4}{Q}$