

HAIGAZIAN UNIVERSITY
FACULTY OF BUSINESS ADMINISTRATION AND ECONOMICS
ECO 231 – ECONOMIC STATISTICS I
MID TERM - SPRING 2009-2010

NAME:

ID:

INSTRUCTOR: ☐ Ms. Joumana Tannous

TIME: 1 HOUR 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 9 pages, including 3 problems, 10 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.	12 %	
2.	4 %	
3.	54 %	
PART II: 4 – 13	30 %	
TOTAL	100 %	

PART I: SOLVE THE FOLLOWING 2 EXERCISES IN THE SPACE PROVIDED

1. Let the sets X and Y be $X=\{A, B, C, D, F, G, J, K, L, M, N\}$ and $Y=\{1, 2, 3, 5, 7, 8, 9\}$. Ms Joumana Tannous has a password for her computer consisting of 2 digits from Y followed by 5 letters from X. In each case find the number of passwords possible.

- a. The password allows repetition on the letters but not the digits.

(3 points)

$$7P_2 \times 11C_5 = 19405 \text{ passwords}$$

- b. The password allows repetition on the digits and the letters.

(3 points)

$$7P_2 \times 11P_5 = 2328480 \text{ passwords}$$

- c. The password allows repetition on the digits but not the letters and the 1st letter to appear is a J and the last one is a N.

(3 points)

- d. The password allows repetition on the digits and the letters and has at least one J.

(3 points)

2. Develop and simplify the following:

a. ${}_{a+3}P_3 = nPr = \frac{n!}{(n-r)!}$

(2 points)

$$\Rightarrow \frac{(a+3)!}{(a+3-3)!} = \frac{(a+3)(a+2)(a+1)}{1} = a^2 + 2a + 3a + 6 = a^2 + 5a + 6$$

b. ${}_{b+2}C_2 =$

(2 points)

$$\frac{(b+2)!}{(b+2-2)!2!} = \frac{(b+2)(b+1)}{(b+1)2} = \frac{b+2}{2}$$

3. The following data represent the quiz 1 grades obtained from a sample of 29 students in a statistics class the letters F and M indicates if the student is female or male:

Ms Y's 29 Students:

17 F.	22 F.	24 M.	25 M.	29 M.	34 F.
37 M.	42 M.	45 F.	46 M.	48 F.	48 F.
48 F.	50 F.	53 F.	54 M.	54 F.	54 F.
56 M.	58 F.	59 M.	60 M.	60 M.	64 M.
65 F.	67 M.	70 M.	76 F.	78 M.	

- a. What is the type and level of measurement of your data

For the grades, the data is quantitative (2 points)
with the ratio level of data, while for the gender the type
is qualitative and has the nominal level of measurement.

- b. Determine the following for the grades of the students.

Mean:

$$\bar{X} = \frac{\sum x}{n} = 49.758$$

(3 points)

the average of quiz 1 for the class was 49.758 points

Median:

$$\text{location} = \frac{n+1}{2} = \frac{30}{2} = 15$$

(3 points)

median = 53 points

=> 50% of the students scored below 53 and
50% above 53

Mode:

Bimodal, as we have the grade 54 (2 points)

and 48 having the highest frequencies
in the distribution and being the most popular 2 grades
among them with frequency of 3 (3 times each)

Range:

The data ranges from 17 to 78

so the range is $78 - 17 = 61$

(2 points)

Standard Deviation:

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}} = 15.99 \quad (3 \text{ points})$$

The deviation away from the mean is 15.99 units ^{units} _{points}

Coefficient of Variance:

$$CV = \frac{s}{\bar{x}} = \frac{15.99}{49.758} = 0.321 \quad (3 \text{ points})$$

The variation of values _{away} from the mean is by 0.321 units ^{units} _{points}

Coefficient of Skewness:

~~$$sk = \frac{\sum (x - \bar{x})^3}{n \cdot s^3}$$~~

$$sk = \frac{(\bar{x} - \text{median})}{s} = \frac{(49.758 - 53)}{15.99} = -0.202 < 0$$

\Rightarrow the distribution is ~~slightly~~ ^{15.99} leftly skewed _{since}

c. Construct a box plot of Ms Y's data. (Show all the information needed and draw your box plots on the grid p5)

(9 points)

$$Q_1: \text{location} = (n+1) 0.25 = 30 \times 0.25 = 7.5 \\ \Rightarrow 37, 42$$

$$Q_1 = 37 + (42 - 37) \times 0.5 \\ = 39.5$$

$$Q_2: \text{location} = 30 \times 0.50 = 15$$

$$\Rightarrow Q_2 = 53 \text{ since } 53 \text{ is at location } 15$$

$$Q_3: \text{location} = 30 \times 0.75 = 22.5$$

$$\Rightarrow Q_3 = 60 + (60 - 60) \times 0.5$$

$$\Rightarrow Q_3 = 60$$

$$IQR = Q_3 - Q_1 = 60 - 39.5 = 20.5$$

lower outlier = $Q_1 - 1.5 IQR =$

$39.5 - (1.5 \times 20.5) = 8.75 < \text{minimum (17)}$

\Rightarrow no lower outlier

~~lower~~

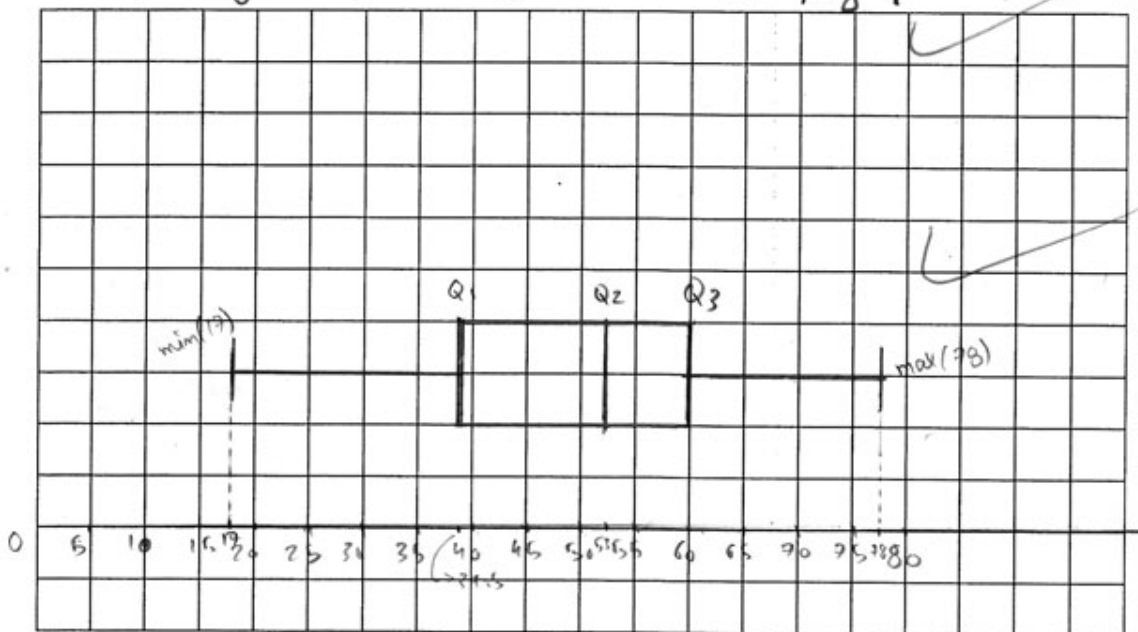
upper outlier:

$Q_3 + 1.5 IQR$

$= 60 + (1.5 \times 20.5) = 90.75 > \text{maximum (78)}$

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Boxplot of the grades of students \Rightarrow no upper outlier.
on quiz 1



d. Comment on the box plot and compare your result with one in part b. p3.

$|Q_1 - Q_2| > |Q_2 - Q_3|$

$13.5 > 7$

\Rightarrow the distribution is leftly skewed which was also identified when we found the coefficient of skewness previously (-0.202)

$Q_2 = \text{median} = 53$

50% of the distribution has values below $Q_2 (53)$ and 50% of the values are above $Q_2 (53)$.

The minimum is 17 and the maximum is 78 so the range is also 61

$Q_1??$
(2 points) $Q_3??$
 $-1/2$

- e. Construct a frequency table starting with a lower class limit of 15 for the first class.

(3 points)

X	F	C.F.	Mid pt.	R.F.
[17; 30[	5	6	23.5	20%
[30; 43[	3	9	36.5	10%
[43; 56[	10	19	49.5	33.3%
[56; 69[	8	27	62.5	26.67%
[69; 82[	3	30	75.5	10%
	29			100%

$$2^k > n(30) \\ \Rightarrow k = 5$$

$$i = \frac{H - L}{5} = \frac{78 - 17}{5} \\ = 12.2 \\ \Rightarrow i = 13$$

- 2

- f. Find the following using the grouped data (no comment needed for this part f):

- o The 7th decile

$$\text{location} = \frac{29}{2} \times 0.7 \\ = 10.15 \approx 10$$

(3 points)

$$D_7 = 56 + \left(\frac{10.15 - 19}{8} \right) \times 13 = 58.1125 \Rightarrow [56; 69[$$

- o The 3rd percentile

$$P_3: \text{location} = \frac{29}{100} \times 0.03 = 0.0087$$

(3 points)

$$P_3 = 17 + \left(\frac{0.0087 - 0}{5} \right) \times 13 \\ = 17.262 \Rightarrow [17; 30[$$

- o The 28th percentile

(3 points)

$$P_{28}: \text{location} = 29 \times 0.28 = 8.12 \Rightarrow [30; 43[$$

$$P_{28} = 30 + \left(\frac{8.12 - 6}{3} \right) \times 13 \\ = 39.186$$

OK

- o The 3rd quartile

Q₃: location = $29 \times 0.75 = 21.75$ (3 points)

$$Q_3 = 56 + \left(\frac{21.75 - 19}{8} \right) \times 13 = 60.468$$

OK

- o The 85th percentile

P₈₅: location = $29 \times 0.85 = 24.65$ (3 points)

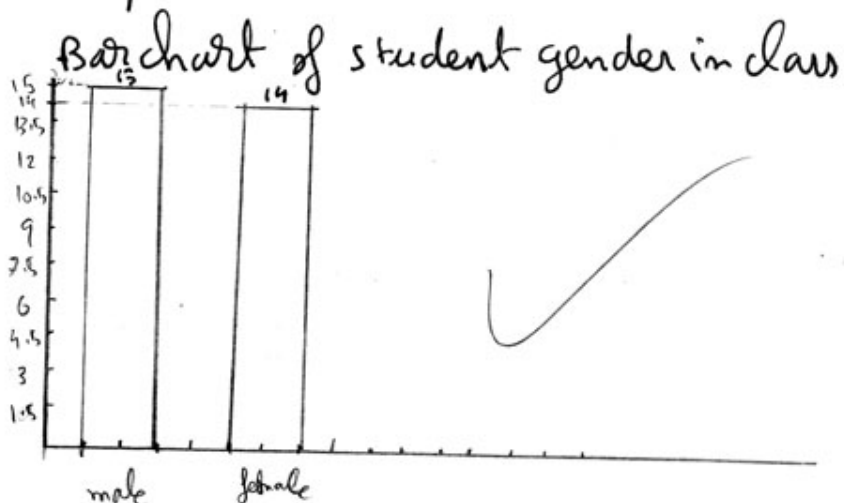
$$P_{85} = 56 + \left(\frac{24.65 - 19}{8} \right) \times 13 = 65.181$$

OK

- g. Represent graphically the gender of the 29 students in a statistics class and comment on your chart.

(4 points)

	Freq.	R.F.
Female	14	48.27%
male	15	51.72%
total	29	100%



most of the students are male while least of the students are female

PART II: CIRCLE THE CORRECT ANSWER FOR EACH OF THE FOLLOWING 10 MULTIPLE CHOICE QUESTIONS (PROBLEMS 4 TO 13). NOTE 3 POINTS FOR EACH CORRECT ANSWER

4. The following data are annualized returns on a group of 7 stocks.

16.7	9	8.3	-1.2	11.6	10	9.5
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-1.2 8.3 9 9.5 10 11.6 16.7

(You will use this same table to answer question 4 and 5.)

14th percentile (P14)

- ❖ -0.348
- ❖ 4.75
- ❖ -1.2

- ❖ -0.06
- ❖ 3.55
- ❖ None of the above

$$(7+1) \times 0.14 = 1.12$$

$$-1.2 + (8.3 - (-1.2)) \times 0.12$$

✓

5. Use the data in question 4: the 3rd quartile (Q3)

- ❖ 9
- ❖ 9.5
- ❖ 10

- ❖ 11
- ❖ 11.6
- ❖ None of the above

$$8 \times 0.75 = 6$$

$$\Rightarrow 10$$

-3

6. An urn contains 3 red striped ball, 8 red solid balls, 6 yellow striped balls and 3 yellow solid balls. The probability of selecting a red ball knowing that it is a striped ball is:

- ❖ 3/8
- ❖ 3/20
- ❖ 11/20

- ❖ 1/3
- ❖ 9/20
- ❖ None of the above

	strip	solid	
Red	3	8	11
Yellow	6	3	9
	9	11	20

7. Two cards are selected at random from a deck of 52 cards without replacement. That is the probability of selecting two red cards in a row?

- ❖ 0
- ❖ 0.3485
- ❖ 0.2451

- ❖ 0.5
- ❖ 0.2135
- ❖ None of the above

$$\frac{26}{52} \times \frac{25}{51} =$$

✓

8. Dow Jones Industrial Average increased from 961 in 1980 to over 9,500 in the third quarter of 2003. The annual rate of increase is best described by

- ❖ Geometric mean
- ❖ Weighted mean
- ❖ Median

- ❖ Mode
 - ❖ Arithmetic mean
 - ❖ None of the above
- ✓

9. Eight airline companies have submitted applications for operating over a new international route. Only two of the companies will be awarded permit to operate over the route. The number of different set of airlines that could be selected is equal to:

❖ 28
❖ 16
❖ 56

❖ 20
❖ 35
❖ None of the above

8C2

10. In an experiment consisting of selecting cards at random without replacement from a deck of standard cards determine the probability that one is heart, one is spade, one is club and one is diamond

❖ 0.0044
❖ 0.0766
❖ 0.1055

❖ 0.0032
❖ 0.0264
❖ None of the above

$$\left(\frac{13}{52} \times \frac{13}{51} \times \frac{13}{50} \times \frac{13}{49} \right) = \frac{1}{49}$$

11. Suppose A and B are events where $P(A) = 0.5$, $P(B) = 0.3$ and $P(B | A) = 0.4$. Determine $P(A \cup B) =$

❖ 0.1
❖ 0.2
❖ 0.3

❖ 0.4
❖ 0.5
❖ 0.6

$$P(A \cap B) = P(A) \times P(B|A) = 0.5 \times 0.4 = 0.2$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.5 + 0.3 - 0.2 = 0.6$$

12. 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)

❖ 1280
❖ 540
❖ 675

❖ 1600
❖ 740
❖ None of the above

13. There are 600 employees at the Tuesday Morning's Department Store corporate headquarters in Columbia: 45% of them are male, 500 of them have attended college, 60 females have not attended college. What is the probability the employee is either female or attended college?

❖ We can not know we need more information

❖ $55\% + \frac{500}{600}$

❖ 0.9333

❖ $\frac{330}{600} + \frac{500}{600}$

❖ 0.8333

❖ None of the above

$$P(F) + P(C) - P(F \cap C) = \frac{270}{600} + \frac{330}{600} - \frac{100}{600} = \frac{500}{600} = 0.8333$$

	m	F	Total
C	230	270	500
\bar{C}	40	60	100
n	270	330	600