

Question I (8 Marks)

- a) Suppose that the faculty of Science accepted 480 students this year with the following distribution. The probability that the student is male = $5/12$, the probability that the student is from courses school = $3/10$ and the probability that the student is female from normal school = $7/16$.

1. (1 Mark) Fill in the following table with the numbers of students.

Sex	School type		Total
	courses	normal	
male			
female			
Total			480

2. (4 Marks) Fill in the missing cells of the following table of probabilities (**use 4 decimal places or fraction answers in its lowest term**) letting $M = \{\text{The student is male}\}$ & $C = \{\text{The student is from courses school}\}$

Event in		Probability
sets notation	words	
	The student is female from normal school.	
$M^c \cap C$	The student is	
$M C^c$	The student is	
$M \cup C$	The student is	

- b) (3 Marks) Kuwait Sheraton rents 20%, 35% & 45% of their needed cars from car rental agencies X, Y & Z respectively. Assume that 20%, 30% & 50% of the cars at X, Y & Z respectively are equipped with Satellite connections. If the car assigned to you is equipped with Satellite connections, compute the probability that it is rented from agency Y.

Question II (8 Marks)

- a) **(2 Marks)** A student has 16 similar notebooks of which 7 are not used yet. If 5 notebooks are randomly selected, **compute** the probability that 3 of them were not used before.
- b) **(3 Marks)** The number of bad sectors in a CD has Poisson distribution with mean 3.
Compute;
1. the mean number of bad sectors in the CD
 2. the standard deviation of the number of bad sectors in the CD
 3. the probability that a given CD has at most 2 bad sectors
- c) **(3 Marks)** Kuwait University placement test consists of multiple-choice questions with 4 possible answers. A student answers each of the 50 English and 20 mathematics questions completely in random.
1. Compute the probability that he gets exactly 15 correct mathematics answers.
 2. Estimate the probability that he gets exactly 15 correct English answers.
 3. Estimate the probability that he gets at least 15 correct English answers.

Question III (8 Marks)

The grade point average (GPA) for Kuwait University students is normally distributed with mean μ and standard deviation **0.6**. Let \bar{X} be the sample mean of a random sample of 25 students.

- a) **(1 Mark)** What is the distribution of \bar{X} ?
- b) **(2 Marks)** Compute the probability that \bar{X} will differ from μ by less than 0.18
- c) **(1 Mark)** Using Chebyshev's theorem find a lower bound for previous probability and comment on the difference.
- d) **(3 Marks)** Assuming that the sample mean is **2.69** test the claim that that $\mu > 2.33$ using a level of significance **0.01**.
- e) **(1 Mark)** What is the P-value of the above test?

Question IV (8 Marks)

- a) (4 Marks) Test the effectiveness of an industrial safety program on the average weekly loss of labor hours due to accidents if a group of 10 plants engaged in the program showed the following results. Use a 0.05 level of significance.

Before	39	59	46	118	33	53	80	32	24	10	
After	36	60	44	119	35	51	77	29	24	11	

- b) (4 Marks) Suppose that the weight of Kuwait University students follow normal distributions with means μ_M for male students and μ_F for female students. The following table contains summary statistics based on random samples of students.

Gender	size	Average	St. Dev
Males	25	65	5
Females	12	55	6

Test $H_0: \mu_M = \mu_F$ against $H_a: \mu_M > \mu_F$. Use $\alpha = 0.05$.

Question V (8 Marks)

Suppose that 30% of Kuwait University students are married. A random sample of 200 students from the **Faculty of Science** gave 50 married students.

- a) **(3 Marks)** Construct a 95% confidence interval for the proportion of married students in the **Faculty of Science**.
- b) **(5 Marks)** Check the claim that the proportion of married students in the **Faculty of Science** is less than the overall proportion of married students in Kuwait University.

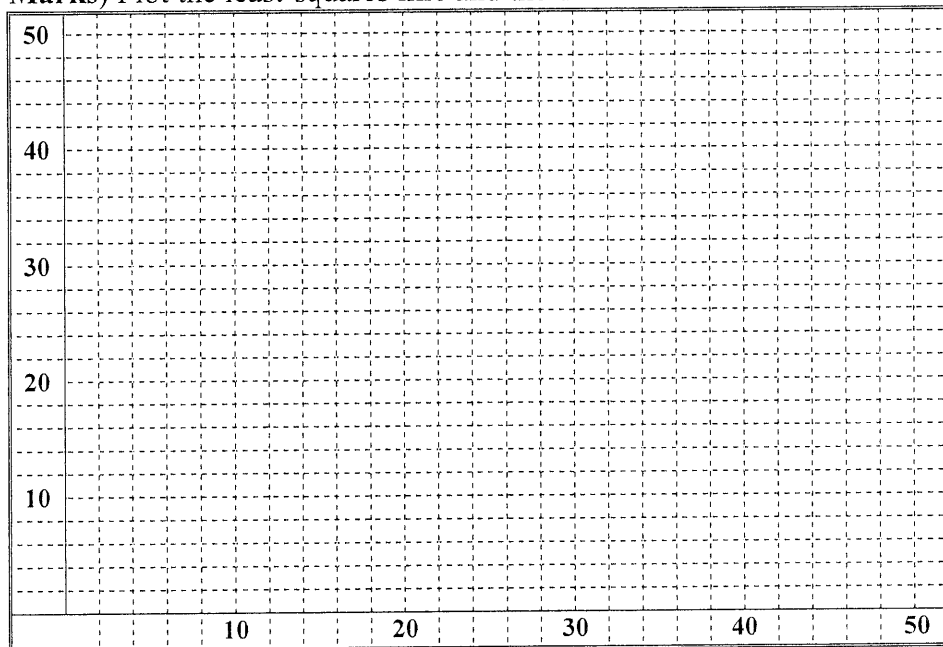
Question VI (10 Marks)

The following data represent the midterm grades for 8 Stat 101 students and their scores in the final exam where $r = 0.96$. The instructor would like to predict the final score from the midterm grades

Student	1	2	3	4	5	6	7	8	Mean	St. Dev.
Midterm	45	30	27	50	37	46	22	41	37.25	10.02
Final	49	35	32	49	43	50	21	41	40.00	10.16

- a. (1 Mark) The explanatory variable is _____. The response is _____.
- b. (3 Marks) Fit the least-squares regression line for the final scores on the midterm grades.

- c. (3 Marks) Plot the least-squares line and the data.



- d. (1.5 Marks) Comment on the relationship between the final scores and midterm grades.
- e. (0.5 Mark) Estimate the final score for a student who got 40 in the midterm.
- f. (1 Mark) Can you estimate the error of the previous answer? (Yes or No). If Yes, find the estimate and if No state the reason.