MATH 1700 **Exam I (Fall 2025)** **Section 101**
Time Limit: 70 minutes

Form A

Print Your Name: Solution **Seat #:**_____

Notes:

1 - DO NOT OPEN THE EXAM UNTIL YOU ARE TOLD TO DO SO.

2 - GIVE ALL THE NECESSARY DETAILS TO GET FULL CREDITS.

3 - IF YOU USE CALCULATOR FOR A PROBLEM, GIVE THE MODEL NAME OF THE CALCULATOR AND THE FUNCTIONS USED HERE: .....

4 - NO ELECTRONIC DEVICES OTHER THAN A CALCULATOR MAY BE USED.

20 pts

1. Consider the following exam grades: 80, 85, 72, 92, 76, 98, 85, 90.

a) Is this a qualitative or a quantitative data?

quantitative

b) Compute the mean.

$$\bar{x} = \frac{\sum x_i}{n} = \frac{80+85+72+92+76+98+85+90}{8} = 84.75$$

c) Compute the median. Sort: 72, 76, 80, 85, 85, 90, 92, 98

$$\text{Median} = \frac{85+85}{2} = 85$$

d) Find the standard deviation.

$$s^2 = \frac{1}{n-1}\left(\sum_i x_i^2 - \frac{1}{n}(\Sigma x_i)^2\right) = 73.93$$

$$s = \sqrt{s^2} = \sqrt{73.93} = 8.60$$

e) Find P_{20} for the ACT scores.

$$\frac{nk}{100} = \frac{8 \times 20}{100} = 1.6$$

$$d(P_{20}) = 2 \Rightarrow P_{20} = 76$$

f) Find the Z-Score of $X_9 = 84$

$$Z_q = \frac{x_q - \bar{x}}{s} = \frac{84 - 84.75}{8.6} \Rightarrow Z_q = -0.0872$$

g) Draw the stem and leaf of the exam grades.

7	2 6
8	0 5 5
9	0 2 8

15 pts

2. In an exit poll, the following information was gathered to detect the male and female voting pattern.

	Democrat	*Republican*	*Independent*	$Total_{Row}$
Male	40	55	5	100
Female	56	41	3	100
$Total_{Column}$	96	96	8	200

a) Express the above table as <u>percentages</u> of the column totals

	Democrat	*Republican*	*Independent*	$Total_{Row}$
Male	41.67	57.3%	62.5%	50%
Female	58.33%	42.7%	37.5%	50%
$Total_{Column}$	100 %	100 %	100 %	100 %

b) What percentage of the people sampled preferred Republican

$$\frac{96}{200} = 48\%$$

c) What percentage of the sample who prefer Republican are Male

$$\frac{55}{96} = 57.3\%$$

15 pts

3. Suppose a population of 1000 values follows a bell-shaped distribution with the mean 40,000 and the standard deviation 10,000.

a) Approximately how many of the population values are between 20,000 and 60,000?

$$0.95 \times 1000 = 950$$

b) Approximately how many values are between 30,000 and 50,000?

$$0.68 \times 1000 = 680$$

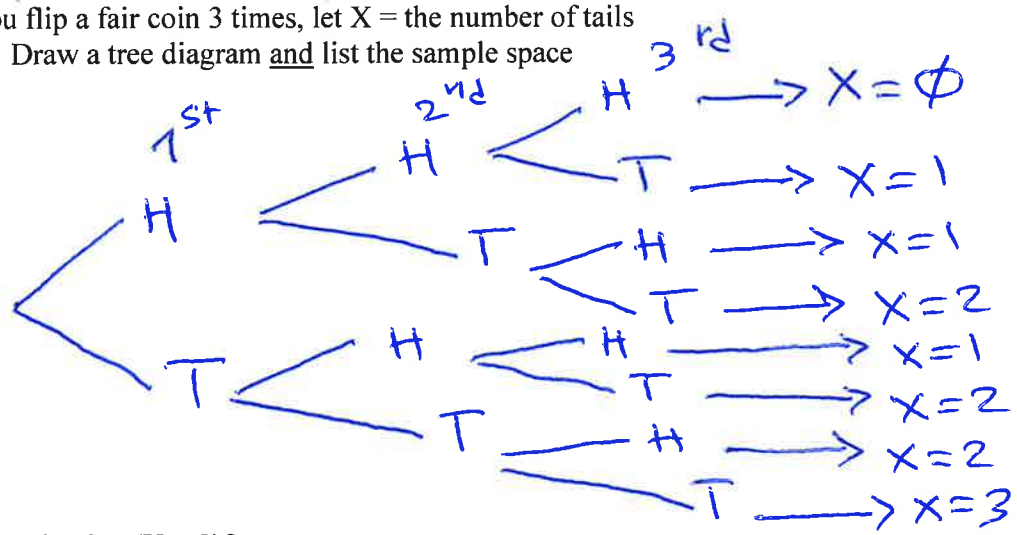
c) What rule did you use to get your answer?

Empirical rule

d) Identify the statement "The brand of a certain tire is." as an example of (1) nominal, (2) ordinal, (3) discrete, or (4) continuous variables.

10 pts

4. You flip a fair coin 3 times, let X = the number of tails
   a) Draw a tree diagram and list the sample space



   b) What is P(X = 2)?

$$P(X=2)=\frac{3}{8}$$

20 pts

5. Suppose I give you a multiple choice exam with 10 questions. Each question has 4 answer choice (a,b,c and d) with only one correct answer. You have not studied the material, and therefore you decide to answer the questions by randomly guessing. Let x to be the "number of correct answers."
   a) What is the probability function of x? binomial probability distribution

$$X \sim Bin(n=10, p=0.25) \Rightarrow P(X=K) = \binom{n}{k} p^k (1-p)^{n-k} =$$

$$= \binom{10}{K} (0.25)^K (0.75)^{10-K}, \quad K = 0, 1, \ldots, 10$$

   b) What is the probability that exactly you answer to 3 questions correctly? (You do not need to simplify your answer.)

$$P(X=3) = \binom{10}{3} (0.25)^3 (0.75)^7 = \frac{10 \times 9 \times 8}{3 \times 2} \left(\frac{1}{4}\right)^3 \left(\frac{3}{4}\right)^7$$

   c) Find the mean of x. $\mu = np = (10)(0.25) = 2.5$

   d) Find the variance of x. $\sigma^2 = np(1-p) = 10(0.25)(0.75)$

$$\sigma^2 = 1.875$$

20 pts

6. Consider the following bivariate data, extensions, and totals:

	x	y	x^2	xy	y^2
	14	2	196	28	4
	13	3	169	39	9
	11	4	121	44	16
	8	5	64	40	25
	9	5	81	45	25
	4	7	16	28	49
	3	7	9	21	49
Sum: Σ	62	33	656	245	177

(a) Find $SS(x)$, $SS(y)$ and $SS(xy)$.

$$SS(X) = \sum_{i=1}^{7} x_i^2 - \frac{1}{n}\left(\sum_{i=1}^{7} x_i\right)^2 = 656 - \frac{62^2}{7} = 106.85$$

$$SS(Y) = \sum_{i=1}^{7} y_i^2 - \frac{1}{n}\left(\sum_{i=1}^{7} y_i\right)^2 = 177 - \frac{33^2}{7} = 21.43$$

$$SS(XY) = \sum_{i=1}^{7} x_i y_i - \frac{1}{n}\left(\sum_{i=1}^{7} x_i\right)\left(\sum_{i=1}^{7} y_i\right) = 245 - \frac{62 \times 33}{7} = -47.28$$

(b) Find the equation of line of best fit.

$$b_1 = \frac{SS(XY)}{SS(X)} = -\frac{47.28}{106.85} = -0.442, \quad b_0 = \frac{\sum_{i=1}^{7} y_i}{7} + \frac{-0.442 \sum_{i=1}^{7} x_i}{7} = 8.63$$

$$\hat{Y} = 8.63 - 0.442X$$

(c) Find the linear correlation coefficient.

$$r = \frac{SS(XY)}{\sqrt{SS(X)\,SS(Y)}} = \frac{-47.28}{\sqrt{106.85 \times 21.43}} = -0.988$$

(d) Predict the value of $\hat{y}$ for $x = 8.86$ using the equation of line you found in part (b).

$$\hat{Y} = 8.63 - 0.44(8.86) = 4.7316$$

PLEASE DO NOT WRITE IN THE FOLLOWING SPACE.

1	2	3	4	5	6	*Total*
20	*15*	*15*	*10*	*20*	*20*	***100***

MATH 1700 **Exam I (Fall 2025)** **Section 101**
Time Limit: 70 minutes

Form B

Print Your Name: Solution **Seat #:**_____

Notes:

1 - DO NOT OPEN THE EXAM UNTIL YOU ARE TOLD TO DO SO.

2 - GIVE ALL THE NECESSARY DETAILS TO GET FULL CREDITS.

3 - IF YOU USE CALCULATOR FOR A PROBLEM, GIVE THE MODEL NAME OF THE CALCULATOR AND THE FUNCTIONS USED HERE: .....

4 - NO ELECTRONIC DEVICES OTHER THAN A CALCULATOR MAY BE USED.

20 pts

1. Consider the following exam grades: 89, 84, 97, 75, 91, 71, 84, 79.

a) Is this a qualitative or a quantitative data?

quantitative

b) Compute the mean.

$$\bar{X} = \frac{89+84+97+75+91+71+84+79}{8} = 83.75$$

c) Compute the median. sort : 71, 75, 79, 84, 84, 89, 91, 97

$$\text{median} = \frac{84+84}{2} = 84$$

d) Find the standard deviation.

$$S^2 = \frac{1}{n-1}\left(\sum x_i^2 - \frac{1}{n}\left(\sum x_i\right)^2\right) = 73.93$$

$$S = \sqrt{73.93} = 8.60$$

e) Find P_{20} for the ACT scores. $\frac{nk}{100} = \frac{8 \times 20}{100} = 1.6$

$d(P_{20}) = 2 \Rightarrow P_{20} = 75$

f) Find the Z-Score of $X_9 = 83$

$$Z_9 = \frac{x_9 - \bar{x}}{S} = \frac{83 - 83.75}{8.6} = -0.0872$$

g) Draw the stem and leaf of the exam grades.

7	1 5 9
8	4 4 9
9	1 7

15 pts

2. In an exit poll, the following information was gathered to detect the male and female voting pattern.

	Independent	*Republican*	*Democrat*	$Total_{Row}$
Male	10	110	80	200
Female	6	82	112	200
$Total_{Column}$	16	192	192	400

a) Express the above table as <u>percentages</u> of the column totals

	Independent	*Republican*	*Democrat*	$Total_{Row}$
Male	62.5 %	57.3 %	41.67 %	50 %
Female	37.5 %	42.7 %	58.33 %	50 %
$Total_{Column}$	100 %	100 %	100 %	100 %

b) What percentage of the people sampled preferred Republican

$$\frac{192}{400} = 48\%$$

c) What percentage of the sample who prefer Republican are Female

42.7 %

15 pts

3. Suppose a population of 1000 values follows a bell-shaped distribution with the mean 400 and the standard deviation 100.

a) Approximately how many of the population values are between 200 and 600?

$(0.95)(1000) = 950$

b) Approximately how many values are between 300 and 500?

$(0.68)(1000) = 680$

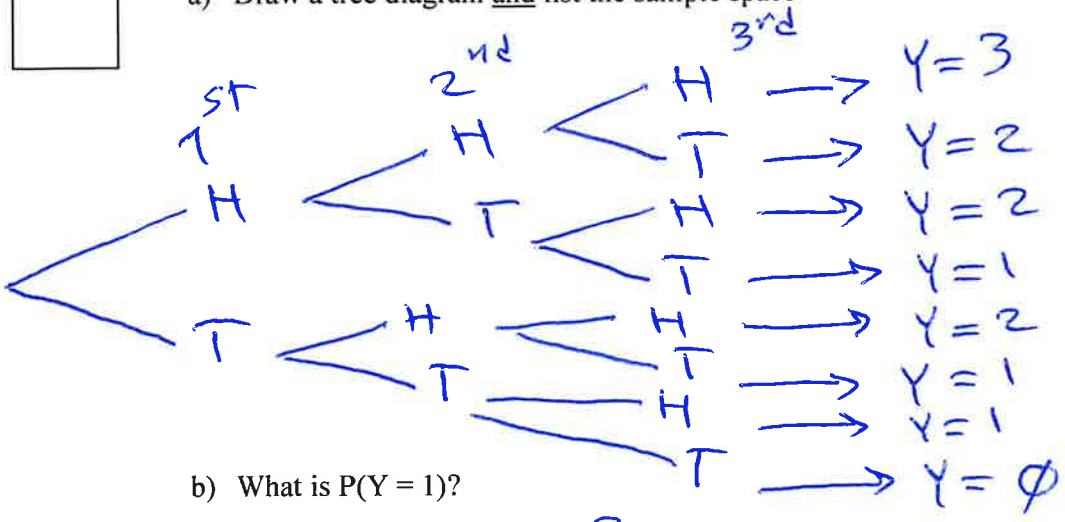
c) What rule did you use to get your answer?

Empirical rule

d) Identify the statement "The brand of a certain tire is." as an example of (1) nominal, (2) ordinal, (3) discrete, or (4) continuous variables.

10 pts

4. You flip a fair coin 3 times, let Y = the number of heads
   a) Draw a tree diagram and list the sample space



   b) What is P(Y = 1)?

$$P(Y=1)=\frac{3}{8}$$

20 pts

5. Suppose I give you a multiple choice exam with 20 questions. Each question has 4 answer choice (a,b,c and d) with only one correct answer. You have not studied the material, and therefore you decide to answer the questions by randomly guessing. Let x to be the "number of correct answers."
   a) What is the probability function of x? binomial probability distribution

$$X \sim Bin(n=20, p=0.25) \Rightarrow P(X=k)=\binom{n}{k} p^k (1-p)^{n-k} = \binom{20}{k} (.25)^k (0.75)^{n-k}$$

   b) What is the probability that exactly you answer to 6 questions correctly? (You do not need to simplify your answer.)

$$P(X=6) = \binom{20}{6} (0.25)^6 (0.75)^{14}$$

   c) Find the mean of x. $\mu = np = 20 \times 0.25 = 5$

   d) Find the variance of x. $\sigma^2 = np(1-p) = 20(0.25)(0.75) = 3.75$

20 pts

6. Consider the following bivariate data, extensions, and totals:

	x	y	x^2	xy	y^2
	2	14	4	28	196
	3	13	9	39	169
	4	11	16	44	121
	5	8	25	40	64
	5	9	25	45	81
	7	4	49	28	16
	7	3	49	21	9
Sum: Σ	33	62	177	245	656

(a) Find $SS(x)$, $SS(y)$ and $SS(xy)$.

$SS(X) = \sum_{i=1}^{7} x_i^2 - \frac{1}{n}\left(\sum_{i=1}^{7} x_i\right)^2 = 177 - \frac{33^2}{7} = 21.42$

$SS(Y) = \sum_{i=1}^{7} y_i^2 - \frac{1}{n}\left(\sum_{i=1}^{7} y_i\right)^2 = 656 - \frac{62^2}{7} = 106.85$

$SS(XY) = \sum_{i=1}^{7} x_i y_i - \frac{1}{n}\left(\sum_{i=1}^{7} x_i\right)\left(\sum_{i=1}^{7} y_i\right) = 245 - \frac{33 \times 62}{7} = -47.28$

(b) Find the equation of line of best fit. $b_1 = \frac{SS(XY)}{SS(X)} = \frac{-47.28}{21.42} = -2.21$

$b_0 = \frac{\sum_{i=1}^{7} y_i}{7} + \frac{2.21 \sum_{i=1}^{7} x_i}{7} = \frac{62}{7} + \frac{2.21 \times 33}{7} = 19.26 \Rightarrow \hat{y} = b_0 + b_1 x \Rightarrow$

$\hat{y} = 19.26 - 2.21x$

(c) Find the linear correlation coefficient.

$r = \frac{SS(XY)}{\sqrt{SS(X)\,SS(Y)}} = -\frac{47.28}{\sqrt{21.42 \times 106.85}} = -0.988$

(d) Predict the value of $\hat{y}$ for $x = 4.71$ using the equation of line you found in part (b).

$\hat{y} = 19.26 - 2.21 \times 4.71 = 8.8599$

PLEASE DO NOT WRITE IN THE FOLLOWING SPACE.

1	2	3	4	5	6	*Total*
20	*15*	*15*	*10*	*20*	*20*	***100***