Math 1332 Contemporary Math
G-Number-

Fall 2018 Exam II

Name (Print): _____

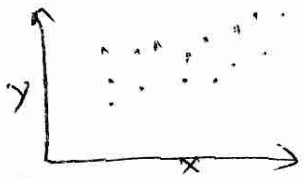
1. (4 points) Define the following with example:

(a) Correlation : A relation between two variables, changing the values of one variable, also changes the values of second variable (that means: one affect other) is the correlation. For example: price of iphone and demand.

(b) Scatter plot

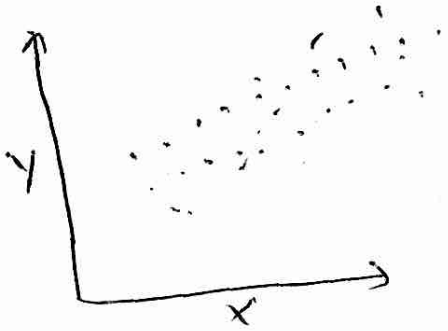
A scatter plot is a graph, in which each points represents the values of two variables.

For Example:

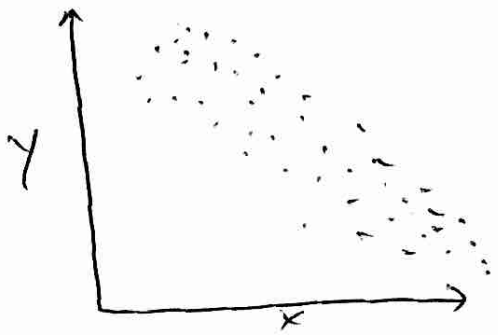


2. (5 points) Draw the scatter plot showing

(a) Positive Correlation



(b) Negative Correlation



3. (8 points) Define the following with example:

(a) Population and Sample

population: complete set of thing or people being studied.

Sample: A small subset of population taken from population representing the whole population.

(b) Sampling

The method of taking sample is called sampling.

(c) Simple random sampling, Systematic sampling and Stratified random sampling.

simple random: where Each and Every element has equal chance of being selelted.

Systematic: Draw sample in a certain system or order.

Startified random: draw sample making different starta (group).

(d) Treatment and Control group

Treatment group: A group where the actual treatment is being applied.

control group: A group which is under study but actually got being actually treated is called control group.

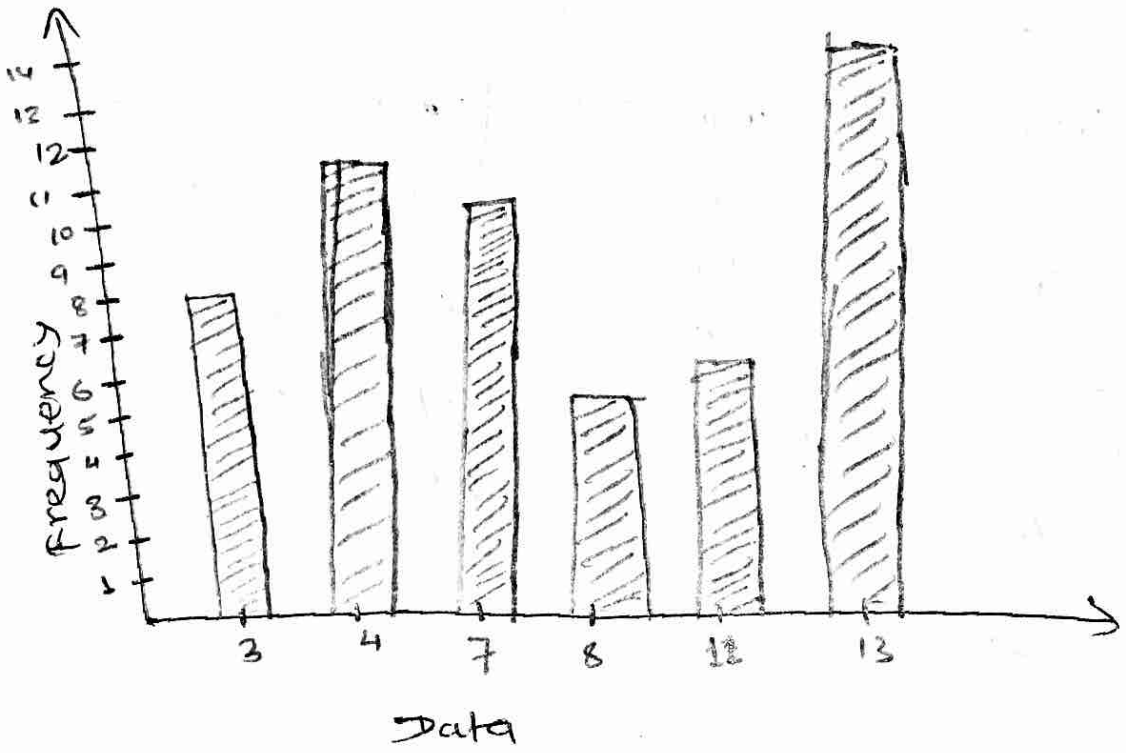
4. (6 points) Make a frequency table and then find cumulative and relative frequency for the following data
A, C, D, F, H, C, C, C, A, C, H, D, D, C, A, F, H, H, H, A, A, D, D, A, A, C, D.

Data	frequency (f)	cummulative frequency	relative frequency:
A	7	7	7/28 = 0.25
C	7	14	7/28 = 0.25
D	6	20	6/28 = 0.21
F	2	22	2/28 = 0.071
H	6	28	6/28 = 0.21
Total	28		

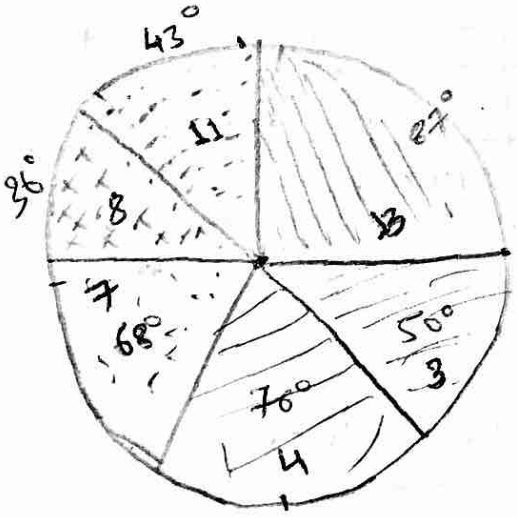
5. (15 points) Make a frequency table and relative frequency also present them in Bar Diagram and Pie-chart for the following data
11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11

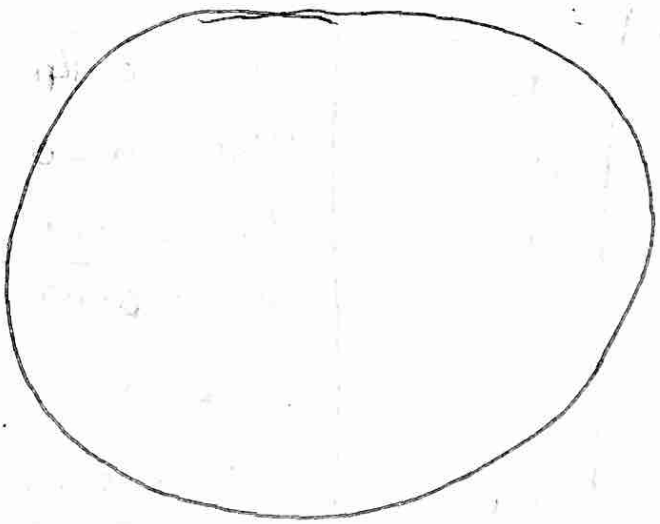
Data	frequency	relative frequency	Degree measure
3	8	8/58 = 0.14	0.14 × 360° = 50.4 ≈ 50°
4	12	12/58 = 0.21	0.21 × 360° = 75.6 ≈ 76°
7	11	11/58 = 0.19	0.19 × 360° = 68.4 ≈ 68°
8	6	6/58 = 0.10	0.10 × 360° = 36°
11	7	7/58 = 0.12	0.12 × 360° = 43.2 ≈ 43°
13	14	14/58 = 0.24	0.24 × 360° = 86.6 ≈ 87°
Total:	58		

Bar diagram



Piechart





6. (6 points) If interest rates stay at 4% APR and I continue to make my monthly \$25 deposit into my retirement plan, how much total money I would have after 30 years.

$R = 4\% = 0.04 \quad P = 25 \quad T = 30 \quad n = 12$

$$A = \frac{P \times \left[\left(1 + \frac{R}{n}\right)^{nT} - 1\right]}{\left(\frac{R}{n}\right)} = \frac{25\left[\left(1 + \frac{0.04}{12}\right)^{12\times 30} - 1\right]}{\left(\frac{0.04}{12}\right)}$$

$$= \frac{25\left[(1.00333)^{360} - 1\right]}{0.00333} = \frac{25\left[3.3135 - 1\right]}{0.00333}$$

$$= \frac{57.8375}{0.00333} = \boxed{17352.97}$$

7. (8 points) Compute the total and Annual returns for: you paid \$8000 for a municipal bond. When it matures after 20 years, you received \$12,500.

$P = 8000$

$A = 12{,}500$

$T = 20$

Total Return $= \left(\frac{A - P}{P}\right) \times 100.\%$

$= \left(\frac{12{,}500 - 8000}{8{,}000}\right) \times 100.\%$

$= \left(\frac{4{,}500}{8000}\right) \times 100.\%$

$= 0.5625 \times 100.\%$

$= 56.25.\%$

Annual return:

$\left(\frac{A}{P}\right)^{\frac{1}{T}} - 1$

$= \left(\frac{12{,}500}{8000}\right)^{\frac{1}{20}} - 1$

$= (1.5625)^{0.05} - 1$

$= 1.02256 - 1$

$= 0.0225$

$= 2.25\%$

8. (6 points) Your goal is to create a college fund for your child. Suppose you find a fund that

offers an APR of 5% How much should you deposit monthly to accumulate \$170,000 in 15 years?

$A = 170{,}000$

$T = 15$

$R = 5.1\% = 0.05$

$n = 12$

$$P = \frac{A \times \left(\frac{R}{n}\right)}{\left[\left(1+\frac{R}{n}\right)^{nT} - 1\right]}$$

$$= \frac{170{,}000 \times \left(\frac{0.05}{12}\right)}{\left(1+\frac{0.05}{12}\right)^{12\times 15} - 1}$$

$$= \frac{708.33}{(1.0042)^{180} - 1}$$

$$\frac{708.33}{2.11370 - 1}$$

$$= \frac{708.33}{1.1137}$$

$$= 636.02$$

monthly deposit should be

\$ 636.02

9. (10 points) Compute the total amount paid and what percent is principal and what percentage is interest paid when you borrowed \$100,000 for a period of 30 years at a fixed APR 5.5%.

$A = 100{,}000$ $n = 12$

$T = 30$

$R = 5.5\% = 0.055$

monthly payment

$$P = \frac{A \times \left(\frac{R}{n}\right)}{\left[1 - \left(1+\frac{R}{n}\right)^{-nT}\right]}$$

$$= \frac{100{,}000 \times \left(\frac{0.055}{12}\right)}{1 - \left(1+\frac{0.055}{12}\right)^{-360}}$$

$$= \frac{458.333}{1 - 0.19277}$$

$$P = \frac{458.333}{0.8073} = 567.74$$

Total amount paid $= 567.74 \times 12 \times 30$

$= 204{,}384.84$

Interest paid $= 104{,}384.84$

Interest % $= \frac{\text{Interest}}{\text{Total}} \times 100\%$

$= \frac{104{,}384.84}{204{,}384.84} \times 100\%$

$= 51.07\%$

principal paid $= 48.92\%$

10. (15 points) Compare the monthly payment, Total payment for the two different option a fixed

loan amount. Compare the pros and Cons of each loan option.
You need \$400,000 loan.
Option 1: a 30-year loan at an APR of 8%
Option 2: a 15-year loan at an APR of 7.5%

$A = 400{,}000$

option 1

$T = 30$
$R = 8.1. = 0.08$
$n = 12$

monthly payment

$$P = \frac{A \times \left(\frac{R}{n}\right)}{\left[1 - \left(1 + \frac{R}{n}\right)^{-nT}\right]}$$

$$= \frac{400{,}000 \times \left(\frac{0.08}{12}\right)}{\left[1 - \left(1 + \frac{0.08}{12}\right)^{-360}\right]}$$

$$= \frac{2666.67}{1 - 0.0914433}$$

$$= \frac{2666.67}{0.9086} = 2934.92$$

Total payment $= 2934.92 \times 12 \times 30$
$= 1{,}056{,}571.87$

pros: less monthly payment

cons: you have to pay way more

option 2

$T = 15$
$R = 7.5.1. = 0.075$
$n = 12$

monthly payment

$$P = \frac{A \times \left(\frac{R}{n}\right)}{\left[1 - \left(1 + \frac{R}{n}\right)^{-nT}\right]}$$

$$= \frac{400{,}000 \times \left(\frac{0.075}{12}\right)}{\left[1 - \left(1 + \frac{0.075}{12}\right)^{-180}\right]}$$

$$= \frac{2{,}500}{\left[1 - (1.00625)^{-180}\right]}$$

$$= \frac{2500}{1 - 0.3258} = \frac{2500}{0.675}$$

$$= 3703.70$$

Total payment $= 3703.70 \times 12 \times 15$
$= 666{,}666.67$

pros: We are paying way less than option 1 in total

cons: Higher monthly payment

11. (10 points) Convert the following data into continuous data and express them in the histogram

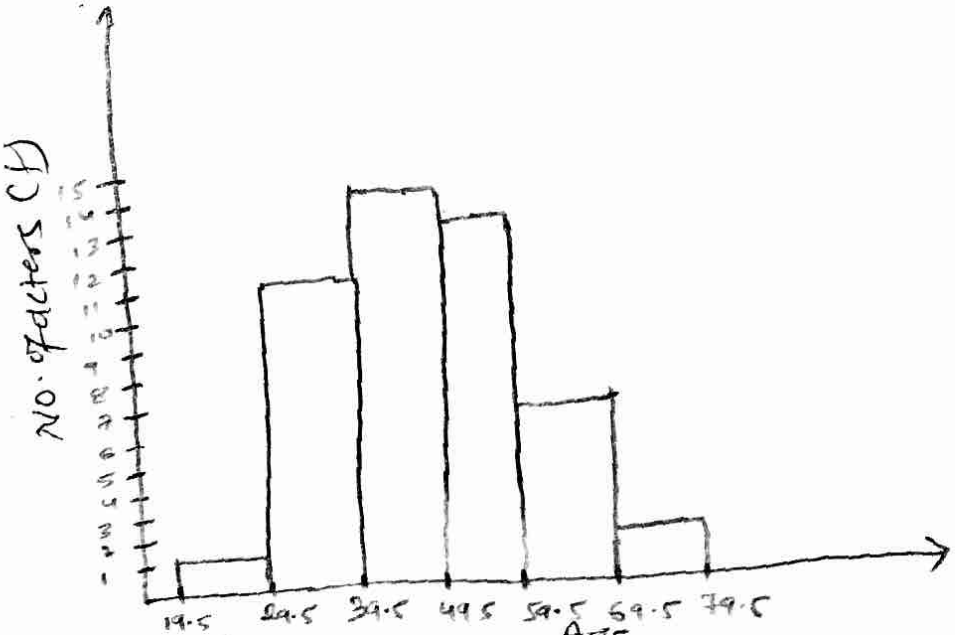
Age of Academy Award-wining Male actor at Time of award	
Age	Number of actors
20-29	1
30-39	11
40-49	14
50-59	13
60-69	6
70-79	2

Table 1: Oscar-winning Male actors

continuous data

Age	No. of actors (f)
19.5 - 29.5	1
29.5 - 39.5	11
39.5 - 49.5	14
49.5 - 59.5	13
59.5 - 69.5	6
69.5 - 79.5	2

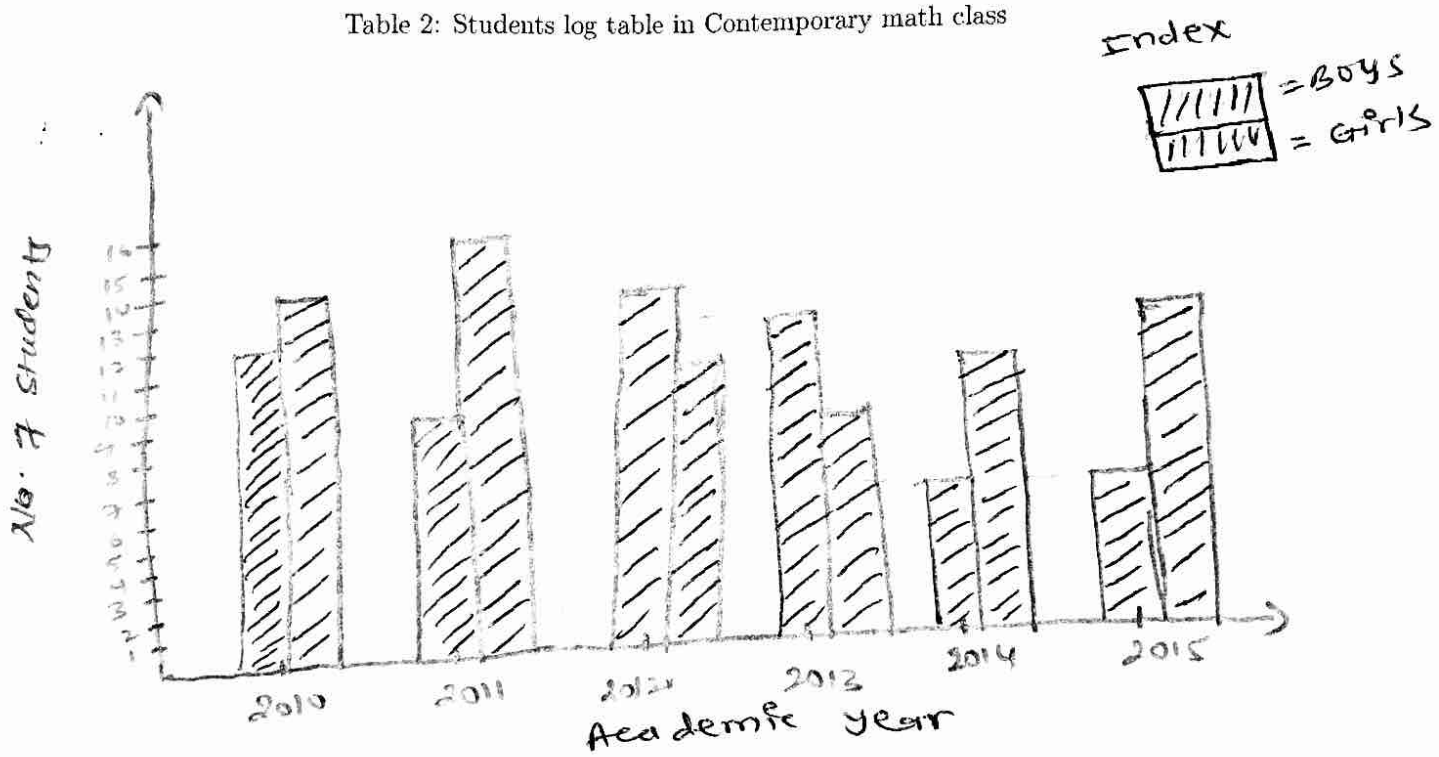
Histogram



12. (7 points) The following data represents the number of boys and girls attended at San Jacinto College from 2010 to 2015 in College Comtemporary math classes. Make a multiple bar diagram (single or double) for these data, with vertical axes representing the number of students running from 1 to 15.

Number of boys and girls from 2010-2015		
Academic year	Number of boys	Number of girls
2010	12	14
2011	9	16
2012	14	10
2013	13	8
2014	6	10
2015	6	12

Table 2: Students log table in Contemporary math class



Bonus:Bonus:Bonus:

13. (6 Bonus: points) Suppose that on the January 1, 2018 you had a balance of \$10,000 on Chase Credit Card which charges APR 20%, you want to paid the balance off in 5 years. Then how much is your monthly payment.

$A = 10{,}000$

$R = 20.1\% = 0.2$

$T = 5$

$n = 12$

$$P = \frac{A \times \left(\frac{R}{n}\right)}{\left[1 - \left(1 + \frac{R}{n}\right)^{-nT}\right]}$$

$$P = \frac{10{,}000 \times \left(\frac{0.2}{12}\right)}{1 - \left(1 + \frac{0.2}{12}\right)^{-60}} = \frac{166.67}{1 - (1.0167)^{-60}} = \frac{166.67}{1 - 0.3701} = \frac{166.67}{0.629} = 264.98 \approx 265$$

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