Course: **Math 121,**   Semester: **Spring 2018**   Name

Date: **February 15th, 2018,**   Duration: **50 min**   ID: .

TEST 1   GRADE: ..../

1. [12] Consider the data given below:

| 10 | 12 | 13 | 15 | 16 | 16 | 17 | 19 | 20 | 22 | 24 | 25 | 26 | 27 | 28 | 30 | 31 | 31 | 33 | 34 |

a. Complete the frequency distribution Table

Classes	Frequency	Cumulative Frequency	Percentage	Cumulative Percentage
10 to less than 15	3	3	$3/20 \times 100 = 15$%	15%
15 to less than 20	5	8	$5/20 \times 100 = 25$%	40%
20 to less than 25	3	11	$3/20 \times 100 = 15$%	55%
25 to less than 30	4	15	$4/20 \times 100 = 20$%	75%
30 to less than 35	5	20	$5/20 = 25 \times$	100%

b. Make a histogram of percentage
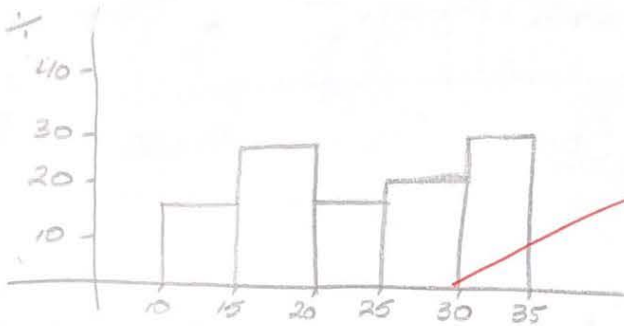
c. Make a **cumulative percentage polygon** (OGIVE)
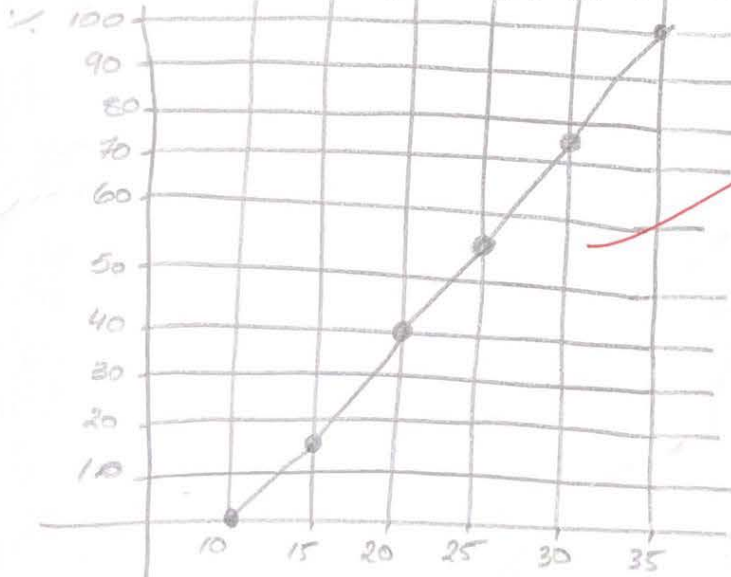
d. Make the stem-and-leaf display

Stem	Leaf
1	02356679
2	0245678
3	01134

e. Find

1. Range $= 34 - 10$

$$= 24$$

2. Mode $\{16, 31\}$

3. Median $= \dfrac{20+1}{2} = 10.5 \Rightarrow$ pos of median

median $= \dfrac{22+24}{2} = \boxed{23}$

4. Q_1

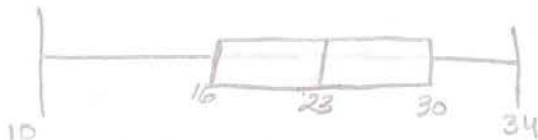Pos of $Q_1 = \dfrac{20+1}{4} = 5.25$

$Q_1 = 16$

5. Q_3

Pos of $Q_3 = \dfrac{3 \times (20+1)}{4} = 15.75$

$Q_3 = 30$

6. IQR.

$30 - 16 = 14$

7. Make a Boxplot.

10   16   23   30   34

8. What is the shape of this distribution?

left skewed

2. Given the Review sheet grades (R) and the Test grades (T)

R	30	44	52	61	63
T	13	20	29	34	39

$\overline{R} = 50$

$\overline{T} = 27$

   a. Find the covariance between the Review sheet grades (R) and the Test grades (T)

$$cov(R,T) = \frac{(30-50)(13-27)+(44-50)(20-27)+(52-50)(29-27)+(61-50)(34-27)+(63-50)(39-27)}{5-1}$$

$$cov(R,T) = \frac{280+42+4+77+156}{4}$$

$$cov(R,T) = 139.75$$

   b. Find the Coefficient of correlation between the Review sheet grades (R) and the Test grades (T)

$$S_R = \sqrt{\frac{(30-50)^2+(44-50)^2+(52-50)^2+(61-50)^2+(63-50)^2}{4}} = 13.5$$

$$S_T = \sqrt{\frac{(13-27)^2+(20-27)^2+(29-27)^2+(34-27)^2+(39-27)^2}{4}} = 10.5$$

$$\text{coef of cor.} = \frac{139.75}{13.5 \times 10.5} = 0.985$$

   c. Comment

very strong positive linear relationship

between R and T

Name: ID: ..

MIDTERM

1. A class-frequency table is given for the ages (in months) of 25 kids in a nursery.

Age (in months)	Frequency	Cumulative Frequency	Relative Frequency	Percentage	Cumulative Percentage
8 but less than 10	8	8	0.32	32 %	32%
10 but less than 12	9	17	0.36	36 %	68%
12 but less than 14	5	22	0.20	20%	88 %
14 but less than 16	3	25	0.12	12%	100 %
Total	25		1	100%	

(handwritten left margin: 9, 11, 13, 15)

a. (4 pts) Fill the table above.

b. (4 pts) Plot a percentage Histogram.
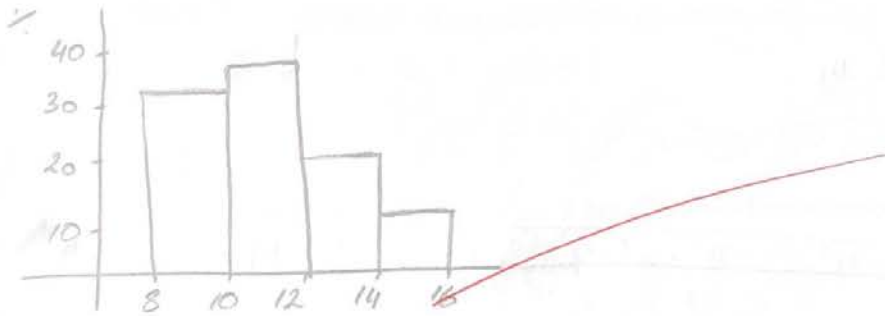
c. (3 pts) Find the approximate mean temperature. age

$$\frac{(9 \times 8) + (11 \times 9) + (5 \times 13) + (3 \times 15)}{25} = 11.24 \approx 11$$

2. Consider the following two variables X and Y:

X	4	5	9	10
Y	2	4	10	12

a. (2 pts) Find the means $\bar{X}$ and $\bar{Y}$.

$$\bar{x} = \frac{4+5+9+10}{4} = 7$$

$$\bar{y} = \frac{2+4+10+12}{4} = 7$$

b. (4 pts) Find the covariance between X and Y.

$$cor(x,y) = \frac{(4-7)(2-7) + (5-7)(4-7) + (9-7)(10-7) + (10-7)(12-7)}{3}$$

$$cov(x,y) = 14$$

c. (4 pts) Find the correlation between X and Y and comment on your answer.

$$s_x = \sqrt{\frac{(4-7)^2 + (5-7)^2 + (9-7)^2 + (10-7)^2}{3}} = 2.94$$

$$s_y = \sqrt{\frac{(2-7)^2 + (4-7)^2 + (10-7)^2 + (12-7)^2}{3}} = 4.76$$

$$cor(x,y) = \frac{14}{2.94 \times 4.76} = 1$$

very strong pos

CR

3. A quality control inspector is checking a sample of lightbulbs for defects. The table summarizes the results. If one of these light bulbs is selected at random, find the followings:

watts	good	defective	total
low	20	50	70
medium	10	70	80
total	30	120	150

a. (4 pts) The probability that the light bulb is **good**.

$$P(g) = \frac{30}{150} = 0.20$$

b. (4 pts) The probability that the light bulb is **good** or **medium** watt.

$$P(g) + P(m) \mp P(g \cap m)$$

$$\frac{30}{150} + \frac{80}{150} - \frac{10}{80} = 0.608$$

c. (3 pts) Find the probability that the light bulb is **defective** given that it is **low** watts.

$$\frac{P(d \cap L)}{P(L)} = \frac{50}{70} = 0.71$$

4. (4 pts) In how many ways can a group of 3 men and 2 women be chosen out of a total of 7 men and 5 women?

$$_7C_3 \times {}_5C_2 = 350$$

5. (4 pts) A team is being formed that includes 7 different players. There are different positions on the team. How many different ways are there to assign the 7 players to the 7 positions?

$$_7P_7 = 5040$$

6. Based on the iPhone purchased information, 70% of the male students' preorder and the rest did not preorder. On the other hand, 30 % of the female students' preorder. Moreover, **40%** of the students purchasing iPhone were female.

a. (4 pts) Fill in the following contingency table

male → 70% P   30 × P'

fem → 30% P   70% P'

40% Fem   60% m

	Male	Female	Total
Preorder	0.42	0.12	0.54
Did not Preorder	0.18	0.28	0.46
Total	0.60	**0.4**	1

b. (3 pts) If we randomly select a student, what is the probability that the student preorder iPhone?

$P(P) = 0.54$

c. (3 pts) What is the probability that a randomly selected student is male given that the student preorder iPhone?

$$\frac{P(m \mid P)}{P(P)} = \frac{0.42}{0.54} = 0.78$$