Explain your steps. The calculations and answers should be written neatly on paper which is attached as a single pdf. Submits the solution on GoogleClassroom with in dua date.

Problem 1

For given data for population, find Mean, Median, Mode, variance, standard deviation three quartiles Q_1, Q_2, Q_3,Range, Max,Min,IQR,Outliers. Also plot ordered stem-and-leaf, dotplot, Box-and-Whisker plot, Histogram using cut point approach(first class from 127 to less than 128). Write two line to explain behavior of Box plot and Histogram. Find the 20 percent trimmed mean .

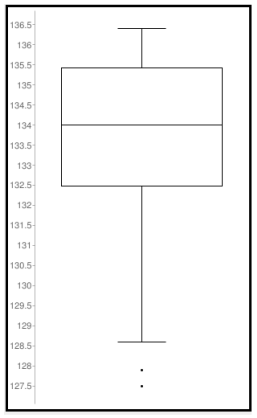
127.5, 127.9, 128.6, 128.8, 129.0, 129.2, 129.4, 129.6, 130.2, 130.4, 130.8, 131.3, 131.4, 131.4, 131.5, 131.6, 131.6, 131.8
131.8, 132.3, 132.4, 132.4, 132.5, 132.5, 132.5, 132.5, 132.6, 132.7, 132.9, 133.0, 133.1, 133.1, 133.1, 133.1, 133.2, 133.2
133.2, 133.3, 133.3, 133.5, 133.5, 133.5, 133.8, 133.9, 134.0, 134.0, 134.0, 134.0, 134.1, 134.2, 134.3, 134.4, 134.4, 134.6
134.7, 134.7, 134.7, 134.8, 134.8, 134.8, 134.9, 134.9, 135.2, 135.2, 135.2, 135.3, 135.3, 135.4, 135.5, 135.5, 135.6, 135.6
135.7, 135.8, 135.8, 135.8, 135.8, 135.8, 135.9, 135.9, 135.9, 135.9, 136.0, 136.0, 136.1, 136.2, 136.2, 136.3, 136.4, 136.4

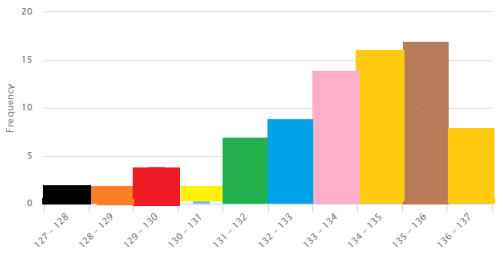
Solution:

Population size: 90
Median: 134
Minimum: 127.5
Maximum: 136.4
First quartile: 132.475
Third quartile: 135.425
Interquartile Range: 2.95
Outliers: 127.5 127.9

Population size:90

Mean (μ): 133.56555555556
Median: 134
Mode: 135.8
Lowest value: 127.5
Highest value: 136.4
Range: 8.9
Interquartile range: 2.95
First quartile: 132.475
Third quartile: 135.425
Variance (σ^2): 4.6720358024739
Standard deviation (σ): 2.1614892556925





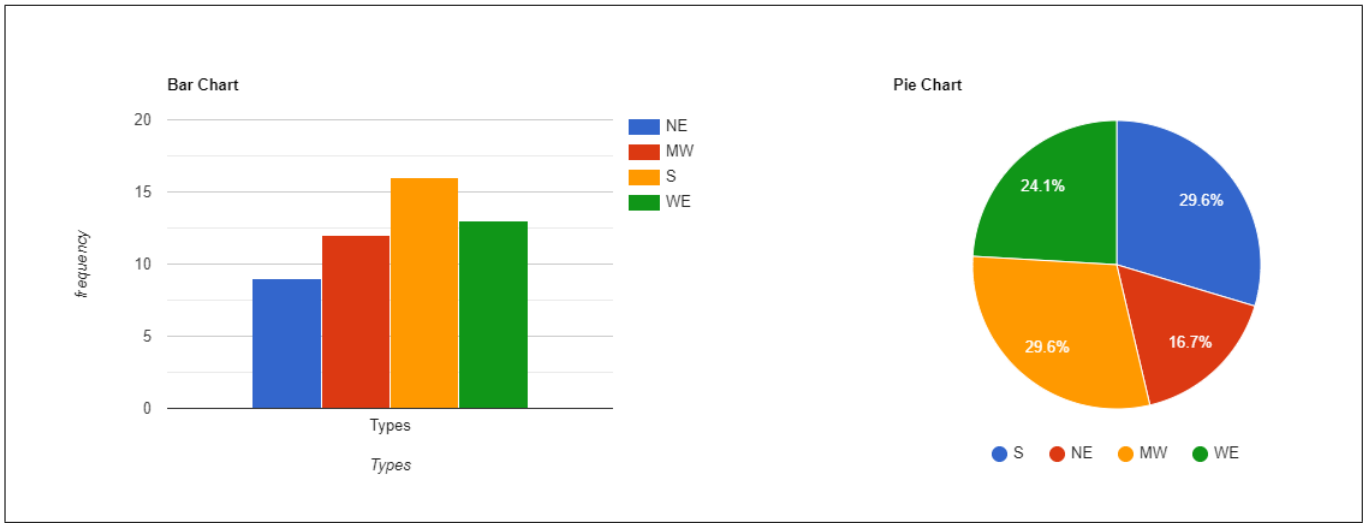
Problem 2

Determine a frequency distribution, obtain relative frequency, draw pie chart, and construct a bar chart of the following data. (NE stand for north east, MW stand for mid-west, S stand for south, WE stand for west)

SO	WE	WE	MW	NE	WE	WE	SO	MW	SO
WE	NE	WE	SO	MW	MW	NE	WE	SO	WE
WE	SO	MW	SO	MW	WE	SO	NE	SO	SO
SO	SO	MW	NE	SO	NE	MW	NE	WE	MW
WE	SO	MW	SO	MW	NE	MW	SO	NE	WE

Solution:

Type	frquency	relative frequency
NE	9	0.18
MW	12	0.24
S	16	0.32
WE	13	0.26
Sum	50	1



Problem 3

Two students are randomly selected from a statistics class, and it is observed whether or not they suffer from math anxiety. List all the outcomes included in each of the following events. Indicate which are simple and which are compound events

(a) Both students suffer from math anxiety.

(b) Exactly one student suffers from math anxiety.

(c) The first student does not suffer and the second suffers from math anxiety.

(d) None of the students suffers from math anxiety.

Solution:

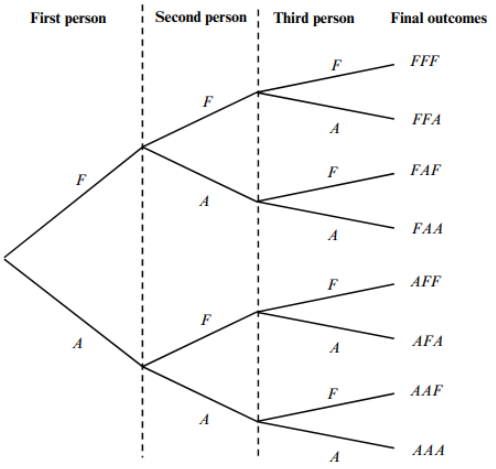
a. $\{YY\}$; a simple event
b. $\{YN, NY\}$; a compound event
c. $\{NY\}$; a simple event
d. $\{NN\}$; a simple event

Problem 4

In a group of people, some are in favor of a tax increase on rich people to reduce the federal deficit and others are against it. (Assume that there is no other outcome such as "no opinion" and "do not know.") Three persons are selected at random from this group and their opinions in favor or against raising such taxes are noted. How many total outcomes are possible? Write these outcomes in a sample space. Draw a tree diagram for this experiment.

Solution:

Let F = person selected is in favor of tax increase and A = person selected is against tax increase. The experiment of selecting three persons has eight outcomes: *FFF, FFA, FAF, FAA, AFF, AFA, AAF,* and *AAA.* The sample space is written as $S = \{FFF, FFA, FAF, FAA, AFF, AFA, AAF, AAA\}$.



Problem 5

In a large city, 15,000 workers lost their jobs last year. Of them, 7400 lost their jobs because their companies closed down or moved, 4600 lost their jobs due to insufficient work, and the remainder lost their jobs because their positions were abolished. If one of these 15,000 workers is selected at random, find the probability that this worker lost his or her job

(a) because the company closed down or moved

(b) due to insufficient work

(c) because the position was abolished

(d) Do these probabilities add to 1.0? If so, why?

Solution:

a. P(company closed down or moved) = 7400/15,000 = 0.4933

b. P(insufficient work) = 4600/15,000 = 0.3067

c. Number of employees losing jobs because position abolished = 15,000 − 7400 − 4600 = 3000
P(position abolished) = 3000/15,000 = 0.2000

d. Yes, the sum of these three probabilities is 1.0 because this experiment has only these two outcomes

Problem 6

Two balanced dice are rolled. What is the probability that the sum of dots is at most 8?

Solution:

When 2 dice are rolled total possible outcomes are 36. Total favourable outcomes to get a sum of 8 are shown in

the following table

Dice 2 \ Dice 1	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

Probability = favourable outcomes /total outcomes = 5/36

Problem 7

Four fair coins are tossed. What is the probability of getting exactly two heads?

Solution:

The very best way to understand this type of problem is to use a tree diagram

1st	2nd	3rd	4th	Result	Description
			H	HHHH	4 heads
		H			
			T	HHHT	3 heads 1 tail
	H				
			H	HHTH	3 heads 1 tail
		T			
			T	HHTT	2 heads 2 tails
H					
			H	HTHH	3 heads 1 tail
		H			
			T	HTHT	2 heads 2 tails
	T				
			H	HTTH	2 heads 2 tails
		T			
			T	HTTT	1 head 3 tails
			H	THHH	3 heads 1 tail
		H			
			T	THHT	2 heads 2 tails
	H				
			H	THTH	2 heads 2 tails
		T			
			T	THTT	1 head 3 tails
T					
			H	TTHH	2 heads 2 tails
		H			
			T	TTHT	1 head 3 tails
	T				
			H	TTTH	1 head 3 tails
		T			
			T	TTTT	4 tails

Probability = favourable outcomes /total outcomes = 6/16

Problem 8

A coin is tossed four times. Find the probability of getting at most two heads.

Solution:

From Solution 7, we conclude that

Probability = favourable outcomes /total outcomes =11/16

Problem 9

The numbers of defective and non defective items produced by day and night shifts were summarized in the following table.

	Defective	Non-defective
Day Shift	3	47
Night Shift	5	45

An item is selected at random. What is the probability that:

Solution: First we tag events , find sum and total in the following table

	D	N	
Day	3	47	50
Night	5	45	50
	8	92	Total=100

(a) It is defective and produced by the day shift.

Solution:

$$P(D\&Day) = P(D) \cdot P(Day|D) = \frac{8}{100} \cdot \frac{3}{8} = 0.08 \times 0.375 = 0.03$$

(b) It is defective or produced by the day shift.

Solution:

$$P(D\ or\ Day) = P(D) + P(Day) - P(D\&Day) = \frac{8}{100} + \frac{50}{100} - \frac{8}{100} \cdot \frac{3}{8} = 0.08 + 0.5 - 0.03 = 0.55$$

(c) It is defective if produced by the day shift.

Solution:

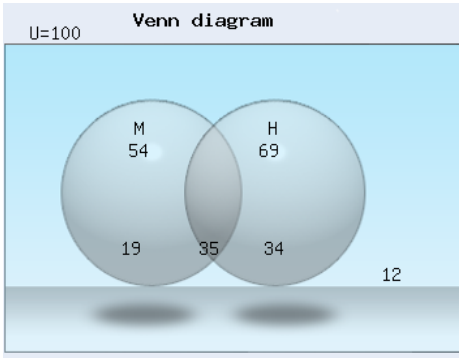
$$P(Day|D) = \frac{P(D\&Day}{P(Day)} = \frac{0.03}{0.5} = 0.06$$

Problem 10

In a college graduating class of 100 students, 54 studies mathematics, 69 studies history and 35 studies both mathematics and history. If a student is selected at random what is the probability that

Solution:

First we tag events and draw the Vann diagram as follows



(a) The students take Mathematics or History. subjects.

Solution:
$P(M \text{ or } H) = P(M) + P(H) - P(M\&H) = \frac{19}{100} + \frac{69}{100} - \frac{35}{100} = 0.53$

(b) The student does not take either of these

Solution:
$P(E) = \frac{12}{100} = 0.12$

(c) The student takes only History.

Solution:
$P(H \text{ only}) = \frac{34}{100} = 0.34$

Problem 11

A and B are independent events with $P(A) = 0.3$ and $P(B) = 0.6$. Find $P(A \cup B)$.

Solution:
$P(A \cup B) = P(A) + P(B) = 0.3 + 0.6 = 0.9$

Problem 12

A and B are two dependent events and $P(A) = 0.25, P(B) = 0.33$, and $P(A \cup B) = 0.43$. Compute $P(A \cap B)$ and $P(B|A)$

Solution:
$P(A \cap B) = P(A) + P(B) - P(A \cup B) = 0.25 + 0.33 - 0.43 = 0.15$

$P(B|A) = \frac{P(A \cap B)}{P(A)} = \frac{0.15}{0.25} = 0.6$