Statistics Assignment 7.1

Problem Statement 1:

Problem Statement 1: *[50 marks]*

The marks awarded for an assignment set for a Year 8 class of 20 students were as follows: 6 7 5 7 7 8 7 6 9 7 4 10 6 8 8 9 5 6 4 8

Mean is given by: $\bar{X} = \frac{1}{20}\sum X_i = \frac{1}{20}(6+7+5+7+7+\cdots+8) = \frac{137}{20} = 6.85$

Median is given by: arrange the data in order of size and average the middle two number i.e.

4 4 5 5 6 6 6 6 7 7 7 7 7 7 8 8 8 8 9 9 10

$$median = \frac{1}{2}(7+7) = 7$$

Mode is the number which appears the most (highest frequency)

$$mode = 7$$

Problem Statement 2: *[50 marks]*

The number of calls from motorists per day for roadside service was recorded for a particular month: 28, 122, 217, 130, 120, 86, 80, 90, 140, 120, 70, 40, 145, 113, 90, 68, 174, 194, 170, 100, 75, 104, 97, 75, 123, 100, 75, 104, 97, 75, 123, 100, 89, 120, 109

Calculate the mean, median, mode and standard deviation for the problem statements 1 & 2.

Mean is given by: $\bar{X} = \frac{1}{35}\sum X_i = \frac{1}{35}(28+122+217+\cdots+109) =$

Median is given by the number in the middle of the ordered data set below

28	40	68	70	75	75	75	75	80	86	89	90	90	97	97	100	100	100	104	104	109
113	120	120	120	122	123	123	130	140	145	170	174	194	217							

Hence the median is 100

Mode is the number which appears the most (highest frequency)

28	40	68	70	75	80	86	89	90	97	100	104	109	113	120	122	123	130	140	145	170	174	194	217
1	1	1	1	4	1	1	1	2	2	3	2	1	1	3	1	2	1	1	1	1	1	1	1

$$mode = 75$$

Problem Statement 3: *[100 marks]*

The number of times I go to the gym in weekdays, are given below along with its associated probability:

x = 0, 1, 2, 3, 4, 5 and f(x) = 0.09, 0.15, 0.40, 0.25, 0.10, 0.01 Calculate the mean no. of workouts in a week. Also evaluate the variance involved in it.

Mean is given by:

$$E[X] = \sum X_i f(X) = 0(0.09) + 1(0.15) + 2(0.40) + 3(0.25) + 4(0.10) + 5(0.01)$$

$$= 0 + 0.15 + 0.80 + 0.75 + 0.40 + 0.05$$

$$= 2.15$$

Problem Statement 4: *[100 marks]*

Let the continuous random variable D denote the diameter of the hole drilled in an aluminium sheet. The target diameter to be achieved is 12.5mm. Random disturbances in the process often result in inaccuracy. Historical data shows that the distribution of D can be modelled by the PDF $f(d) = 20e^{-20(d-12.5)}, d \geq 12.5$. *If a part with diameter > 12.6 mm needs to be scrapped, what is the proportion of those parts? What is the CDF when the diameter is of 11 mm? What is the conclusion of this experiment?*