

Assignment#3 (28 Marks)**Question#1: (6 marks)**

- a. 'Computer Repair Services' receives on average, 4 service calls every hour. Calculate the following probabilities.
- There will be no service call in the first 20 minutes.
 - There will be a service call for the first time between 21 and 33 minutes.
- b. The "Mean Time Between Failure" also known as MTBF for a given electronic equipment is 3 years.
- Calculate the probability that the equipment will fail for the first time between the second and third year.
 - If only 10% of the equipment is expected to fail by the end of the first year, what should be the MTBF for this electronic equipment?
 - From what you calculated in part "ii." of this sub-question, describe in your words the importance of quality control and warranty based recalls of the equipment produced.

Question#2: (6 marks)

Large investment banks do massive amount of electronic trading based on some very sophisticated software they develop and use effectively. Individual investors do not have the benefit of such dedicated specialized software and as such, when they do on-line trading, their success rate is about 30%. If an individual engages in on-line trading for 100 times, calculate:

- the expected value and standard deviation of the number of successful trades.
- the approximate probability that more than 36 trades will be successful.
- what conditions need to be satisfied and corrections to be used do the calculation in part "ii" above.
- Calculate the precise value of the probability by using MiniTab and an appropriate distribution.
- If % error is defined as $(\text{Approximate Value} - \text{Precise Value}) / (\text{Precise Value}) * 100$, calculate this % error and comment on your calculation based on approximate method. How good is your approximation?

Question#3: (9 marks)

Here ROI stands for "Return On Investment" in dollars, and $f[x1 \cap y1]$ stands for $P[x1 \cap y1]$.

X: RV indicating ROI/unit of Investment of one type

Y: RV indicating ROI/unit of investment of another type

Following is the relevant information giving the "Joint" and "Marginal" probabilities (also called distributions) for the two investment types, X and Y.

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Random Variable	Y = (y1 = 6)	Y = (y2 = 10)	Total/Marginal
X = (x1 = 4)	$f[x1 \cap y1] = 0.10$	$f[x1 \cap y2] = 0.5$	$f[X = x1] = 0.6$
X = (x2 = 6)	$f[x2 \cap y1] = 0.30$	$f[x2 \cap y2] = 0.1$	$f[X = x2] = 0.4$
Total/ Marginal:	$f[Y = y1] = 0.40$	$f[Y = y2] = 0.6$	1.0

- Calculate the $E[X]$, $Var[X]$, $STD[X]$ and $CV[X]$
- Calculate the $E[Y]$, $Var[Y]$, $STD[Y]$ and $CV[Y]$
- Calculate $Cov[X,Y]$ and Correlation Coefficient " ρ "
- If RV 'Z' indicates 200 units of RV 'X' and 100 units of RV 'Y' and this RV 'Z' makes up your investment portfolio, calculate $E[Z]$, $Var[Z]$, $STD[Z]$ and $CV[Z]$.
- By comparing the various coefficients of variation, what can you say about the volatility of the three RVs? Can you say why this is so in the above situation?
- Based on your reasoning, can you generalize a very important investment principle?

Question#4 (7 marks)

The following data was recorded for the "Age" of the various participants in a sports activity at a community centre.

Age: 1
 20 32 36 37 29 20 27 30 25 37 22 20 20 36 38
 32 35 25 24 32 20 27 23 26 28

Use MiniTab to obtain the answers to following questions and draw the required diagrams.

- Find values of Mean, Median, Standard Deviation
- Find values of First, Second and Third Quartile and the Inter Quartile Range (IQR).
- Draw the boxplot, histogram, stem and leaf diagrams. Based on boxplot, what can you roughly say about the data? Now calculate the value of the median by simply using the stem and leaf diagram.

It was found that the 14 th observation was recorded incorrectly. It should have been '56' instead of 36. In light of this, answer the following by using MiniTab.

- Find values of Mean, Median, Standard Deviation and draw the boxplot for this slightly altered data. Can you see something unusual in the boxplot and comment on the values of Mean, Standard Deviation and Median when you compare them with what you found in part 'a' above?