Unity University Adama Campus

Department of Computer Science

Introduction to Statistics (STAT 2091) Group Assignment I (from 10%)

Submition deadline: *March 29, 2023*

1. A fair die is tossed. Let a random variable X denote *twice the number appearing*, and let a random variable Y denote 1 or 3 *according as an odd or an even number appears*. Then, determine the value of the random variables: (**2 pts.**)

a) X

b) Y

c) X+Y

d) Construct the probability distribution of X and Y

2. Universities are to be selected from a list of 42 Ethiopian universities by systematic random sampling. If the first sample is the 4^{th} university from the list, what will be the last one? (**1 pt.**)

3. Let $\bar{X}$ be the mean of a random sample of size 50 drawn from a population with mean 112 and standard deviation 40. (**3pts.**)

a) Find the mean and standard deviation of $\bar{X}$

b) Find the probability that $\bar{X}$ assumes a value between 110 and 114.

c) Find the probability that $\bar{X}$ assumes a value greater than 113.

4. Electrical resistors made by a particular factory have a coefficient of variation of 0.28% with a normal distribution of resistances.

a) Find the 99% confidence interval for the mean of samples of size five if the population mean is 10.00 ohms. (**1 pt.**)

b) How many observations must a sample contain to give at least 99.5% probability that the sample mean is within 0.30% of the population mean? (**1 pt.**)

5. The manufacturer of the Energy-saver furnace claims a mean energy efficiency of at least 0.83. A sample of 21 Energy-saver furnaces gives a sample mean of 0.81 and sample standard deviation of 0.060. Data show approximately a normal distribution. Test whether the manufacturer's claim can be rejected at the 5% level of significance. (**2 pts.**)