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CSC 579 – SIMULATION ASSIGNMENT 3

A correlogram is a plot of the r_k vs. lag k. The x – axis is the values obtained for lag k from the formula given below

$$R_k = \frac{\sum_{i=1}^{n-k}(x(i)-mean\ )(x(i+k)-mean\ )}{n}$$

Where,
Mean is the mean of all the elements in the observation,
x(i) is the ith observation in the list of all observations

and,

$$r_k = R_k/R_0,\ R_0 = \sigma^2$$

Where,
σ = Variance
Using the values obtained for r_k, a correlogram was plotted and the result is as shown below

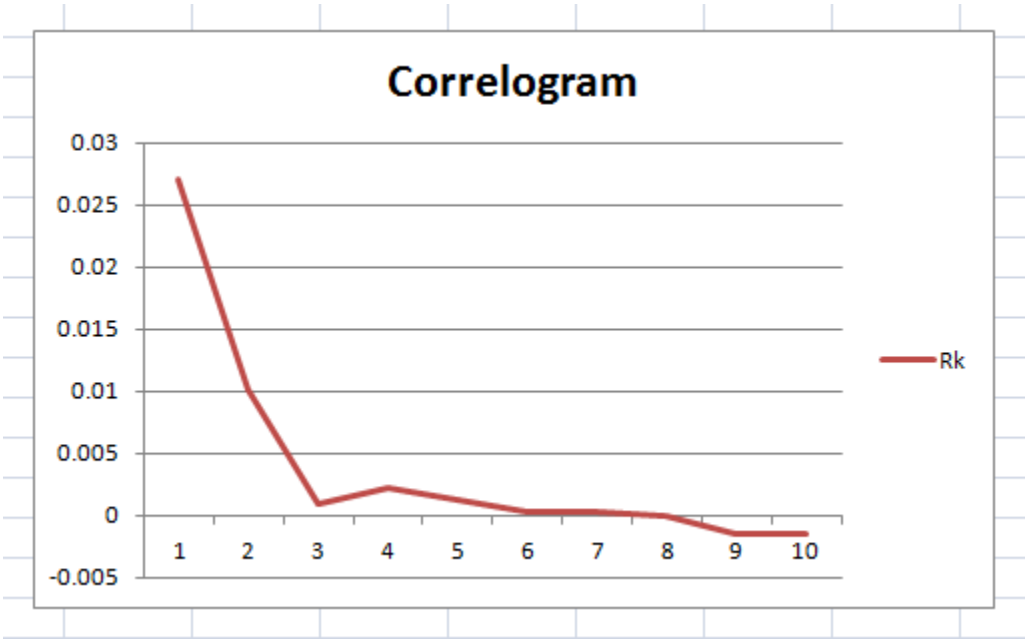

Fig 1 – Correlogram obtained from a given set of data

From the correlogram, it can be seen that r_k intersects the x-axis at a point that is a little over 5. Multiplying this value by 5, we obtain the batch size to be 27. Using 27 as the batch size, the output for the batch means is as shown below.

```
Enter the mean repair time
0.2
Enter the mean operational time
0.4
Enter the number of elements in each batch
27
Enter the number of batches
35
BEFORE BATCH MEANS METHOD
Mean of 1000 elements =  0.35905
Standard Deviation of 1000 elements =  0.302537927374
AFTER BATCH MEANS METHOD
Ratio after sequential procedure =  0.0903973107966
Lower CI =  0.330933503075
Higher CI =  0.362265150124
CI Range =  0.0313316470485
Mean obtained from batch means method =  0.346599326599
95% Percentile =  0.94
```

Fig 2 – Output using the batch size obtained from the correlogram

The batch-means method calculates the mean of a set of values by dividing them into a fixed number of batches. The ratio of range of the Confidence Interval calculated using the batch means to the mean should be lesser than 0.1. If this is not satisfied, the batch means is re-calculated with more observations. This procedure is repeated till the ratio is lesser than 0.1.