management science

**Paper details:**

Assume that for a gas and car wash station one car can be serviced at a time. The arrivals follow a Poisson probability distribution, with an arrival rate of 1 car every 10 minutes and the service times follow an exponential probability distribution, with a service rate of 8 cars per hour. 1.What is the probability that the station will be idle? 2.What is the average number of cars that will be waiting for service? 3.What is the average time a car will be waiting for service? 4.What is the average time a car will be at the gas and wash station? Given the following Operating Characteristics from a queuing model with time units specified in hours, answer the five questions: Po = 0.4000 Lq = 0.9000 L = 1.5000 Wq = 0.2000 W = 0.3000 Pw = 0.6000 1.What is the average time, in minutes, a customer waits in line before being served? 2.What is the average time, in minutes, a customer spends waiting and being served? 3.What is the average number of customers in the system? 4.What is the probability that there are no customers in the system? 5.If the system serves a customer every 4 minutes, what is the service rate? Consider the following set of time series sales data for a growing company over the past 8 months: Month sales 1 15 2 13 3 18 4 22 5 20 6 23 7 22 8 21 1.Construct a time series plot. What type of pattern exists? 2.Develop a forecast for the next month using the averaging method. 3.Develop a forecast for the next month using the naïve last-value method. 4.Develop a forecast for the next month using a four-month moving average method. 5.Use the Excel Functions SLOPE and INTERCEPT to write the linear regression prediction equation with Months as the independent variable and sales as the dependent variable. 6.Use the prediction equation to estimate the number of sales in month 9. Frank’s Barber Shop is a popular local barber shop. He estimates that the time required to serve a customer on each visit has a uniform distribution between 15 minutes and 45 minutes. 1.Simulate the service times for five customers by using the following five random numbers: 0.6905, 0.1740, 0.0443, 0.5975, 0.1178. 2.Calculate the average of the five service times and compare it to the mean of the service-time distribution. 3.Use Excel to generate 500 random observations and calculate the average. Compare this average to the mean of the service-time distribution.