Problem.

National Bank is considering changing the day for scheduled maintenance for the automatic teller machine (ATM) in the lobby. The average number of people using it between 8 and 9 A.M is 60, except on Friday, when the average is 90. The management decision must balance the efficient use of maintenance staff while minimizing customer inconvenience.

i) Does knowledge of the two average figures affect the manager's expected value (for inconvenienced customers)?

ii) Taking the data for all days together, the relative probability of inconveniencing 90 customers is quite small. Should the manger expect many inconvenienced customers if the maintenance day is changed to Friday?

Solution.

i) The manager could expect that there are $90 / (6 \cdot 60 + 90) = 0.2 = 20\%$ of inconvenienced customers on Friday and $60/(6 \cdot 60 + 90) = 0.13 = 13\%$ on other day.

ii) The expectation of inconvenienced customers on Friday is for $20\% - 13\% = 7\%$ more than on other day, it is more than half of inconvenienced customers on other day. It is quite a lot, so the manager could expect many inconvenienced customers if the maintenance day is changed to Friday.