

# 2013 HiMCM

## Problem B: Bank Service Problem

The bank manager is trying to improve customer satisfaction by offering better service. Management wants the average customer to wait less than 2 minutes for service and the average length of the queue (length of the waiting line) to be 2 persons or fewer. The bank estimates it serves about 150 customers per day. The existing arrival and service times are given in the tables below.

Time between arrival (min.)	Probability
0	0.10
1	0.15
2	0.10
3	0.35
4	0.25
5	0.05

**Table 1:** Arrival times

Service Time (min.)	Probability
1	0.25
2	0.20
3	0.40
4	0.15

**Table 2:** Service times

- (1) Build a mathematical model of the system.
- (2) Determine if the current customer service is satisfactory according to the manager guidelines. If not, determine, through modeling, the minimal changes for servers required to accomplish the manager's goal.
- (3) In addition to the contest's format, prepare a short 1-2 page non-technical letter to the bank's management with your final recommendations.