Surprise test-2

1. A repair shop attended by a single machine has average of four customers an hour who bring small appliances for repair. The mechanic inspects them for defects and quite often can fix them right away or otherwise render a diagnosis. This takes him six minutes, on the average. Arrivals are Poisson and service time has the exponential distribution. You are required to:
   (*a*) Find the probability of time during which the shop is empty.
   (*b*) Find the probability of finding at least one customer in the shop?
   (*c*) What is the average number of customers in the system?
   (*d*) Find the average time spent, including service.

2. A super market has two girls ringing up sales at counters. If the service time for each customer is exponential with mean of 4 minutes, and if people arrive in a Poisson fashion at the rate of 10 per hour. Find
   (*a*) What is the probability of having to wait for service?
   (*b*) What is the expected percentage of idle time for each girl?
   (*c*) If a customer has to wait, what is the expected length of waiting time?

3. Solve the following quadratic programming problem by Wolf method :
   Maximize $2x_1 - x_1^2 + x_2$
   Subject to $2x_1 + 3x_2 \leq 6$,
   $2x_1 + x_2 \leq 4, \quad x_1, x_2 \geq 0.$

4. Solve the following LPP using Gomory's cutting plane method :
   Minimize $Z = 2x_1 + 3x_2$
   Subject to
   $-x_1 + x_2 \leq 1$,
   $2x_1 + x_2 \leq 2$,
   $x_1 \geq 0, x_2 \geq 0$, and integers.

5. In a certain game player A has three possible courses of action *L*, *M* and *N*, while *B* has two possible choices *P* and *Q*. Payments to be made according to the choice made.

Choices	**Payments**
L,P	B pays A Rs.1
L,Q	B pays A Rs. 7
M,P	B pays A Rs.7
M,Q	B pays A Rs.2

N,P	B pays A Rs.5
N,Q	B pays A Rs.1

What are the best strategies for players *A* and *B* in this game? What is the value of the game for *A* and *B*?