**EASTERN MEDITERRANEAN UNIVERSITY**



**Department of Industrial Engineering**

**IENG514 Stochastic Processes and Applications**

**HOMEWORK 5 Fall 20167-18**

1. Order arrive in a pizza restaurant according to Poisson process with mean time between order is 10 min. Order are either vegetarian pizza (*p=0.25*) or chicken pizza (*q= 0.75)*. The company makes 3 TL profit on vegetarian pizza and 4.5 TL on chicken pizza. Find the mean & variance of the profit of the company in an 8 hour day.
2. The number of accidents in a town follows a Poisson process with mean of 4 per day and the number *Xi* of people involved in the *i*th accident has the distribution ( independent) *Pr{Xi=k}=(0.25)k (k>0)*. Find the mean and the variance of the number of people involved in accidents per week. If the probability for involving a child in each accident be 0.05, what is the probability that there are 5 children in one week?
3. A person enlists subscriptions to a magazine; the number enlisted being given by Poisson process with mean rate 10 per day. Subscribers may subscribe for 1, 2 or 3 years two by two independently, with respective probabilities,  and. If he received commission $2, $5 and $12 for 1, 2 and 3 year subscriptions respectively, compute expected value and variance of the total commission earned in 30 months.

1. In a Poisson process with mean *λ*, show that the waiting time for change of a state same as *i* has exponential distribution with parameter *λ*.
2. For a non–homogenous Poisson process, the intensity function is given by



Asuume that we know number of events in first 2 minutes is 6. Calculate the probability that next event occur after more than first 5 minutes.

1. Suppose that number of defects in each 5by3 sheet of carpet follow the non hemogeneous Poisson model with the following intensity function



1. What is the probability that exactly 5 defects exists in first 3 m2 of this sheet?()
2. What is the mean of the defects in rest of the sheet?
3. Customers arrive at a restaurant in groups consisting 2,3 or 4 individuals and the arrival of groups in accordance with a Poisson process with mean rate *3* . The arrival probability of group with 3 individuals is two times of arrival probability of other groups.
4. Find the mean of customers arriving in 4 hours.
5. Find the probability that the total arrival customers in one hour exactly be 5 persons.
6. With which probability this restaurant must prepare 4 tables for groups with 4 individuals in first 2 hours.