Ministry of Higher Education & Scientific Research/ Salahaddin University-Erbil

College of Administration and Economics

Department: **Statistics and Informatics**

Stage: **Four Year**

**Bank of Question for Probability Models**

1. A/Define Bernoulli Process with example, B/Define Poisson Processes with example
2. Properties of Counting process
3. What is the Relation of Poisson and gamma distribution?
4. Prove P((N(t + h) -N(t)) >1) = o(h)
5. Proof For each k, Tk has a negative binomial distribution with parameters k and p



Q3 (**20 marks) / The probability of a female student passing the driving test is 0.6, and the probability of a male passing it is 0.8.**

1. The probability that three female will pass the driving test in the 14th test
2. When male students are tested, what is the probability of passing at least two driving tests in the eighth test?
3. Find the mean and variance for the female pass the driving test in the 11th test?
4. Find the probability that among 6 students only 4 students passed the test driving course?
5. On average (expected), how many students will have to take driving test to pass the second test?

Q3 (**20 marks) / Customers arrive at a bank according with a Poisson process with a rate 20 customers per hour. The probability that the customer is male 0.7 or female is 0.3**

1. What is the probability that two customers arrived during the first hour?
2. What is the probability that less than one arrived during the first 20 minute?
3. Find the expected waiting time until the seven Customers arrive at a bank?
4. What is the probability that at most 3 male customers will arrive between 11:00 and 11:30
5. What is the probability you will have to wait for more than a 2 hour?
6. **Define Poisson Processes, with properties of a Poisson Processes:**
7. **Prove P((N(t + h) -N(t)) >1) = o(h)**
8. **Prove For each k, Tk has a negative binomial distribution with parameters k and p**



Q2**(20marks)**/The buses arrive at a particular stop according to a Poisson process with rate (λ=10 )buses per hour.

1. **What is the probability that no buses arrive in the next half-hour?**
2. **Haw many buses are expected to arrive in 2 hour?**
3. **What is the average time for the buses arrive at a particular stop.**
4. **What is the probability that at least 2 buses arrive in 3 hour?**
5. **What is the probability that the time between the arrival of the 3th buses and the arrival of the 5th buses is more than 20 minutes?**

Q3**(20 marks)**/ **A sequence of Bernoulli trials consists of choosing lamps (big and small) at random in two box independent . A selected big lamps at probability 0.2 defective, and defective small lamps probability 0.3 . Determine the probabilities of the following events:**

* 1. **In big lamps selects (defective), the first success occurs on the fifth trial?**
	2. **In small lamps selects (defective), the third success occurs on the eighth trial?**
	3. **In two box selects (defective) (big and small together ), the fourth success occurs on the tenth trial?**
	4. **Find the mean defective for third small lamps?**