MTH 371: Assignment I

September 16, 2021

Instructions

- Use statistical software R for your codes.

- Only basic built-in functions available in R are allowed.

- Due date is September 23, 2021 (11.59 p.m. IST). No late assignments will be accepted.

- Submit all of your work which include the codes, results, graphs and reports.

1. (15 points) For a Bernoulli process, answer the following questions

    (a) Use $p = 0.7$ and simulate number of arrivals for $t = 10, 50, 100, 500$.

    (b) From part (a), plot t versus probability of number of arrivals. What do you observe.

    (c) From part (a), plot t versus cumulative distribution function of number of arrivals. What do you observe.

    (d) Simulate number of arrivals with $p = 0.1$ and $t = 100$ and plot the density. Describe your observations.

    (e) In Bernoulli process, the interarrival times follow Geometric (p). Let $p = 0.7$, plot the cumulative distribution function of X_1.

2. (10 points) Suppose that the customers arrive at a retail store at a rate of 20 customers per minute. We are interested in studying number of customers in a long run. Let's assume we can model it as a Poisson process. Answer the following questions

    (a) Simulate the density of number of arrivals until time $t = 50, 100$. Provide the related graphs.

    (b) Simulate the cumulative distribution function of number of arrivals until time $t = 50, 100$. Provide the related graphs.

    (c) In part (a) and (b), make comparison w.r.t. t.