



### Assignment 3

Elements of Statistics and Probability (STA 201)

Department of Mathematics and Natural Sciences

BRAC University

Fall 2024

15 Marks

1. A new drug is being tested, and it is known that the drug has a 70% success rate in treating a specific disease. Suppose 6 patients are treated with the drug.
  - a) What is the probability that fewer than 3 patients will be successfully treated?  
**[2.0]**
  - b) What is the probability that none of the 6 patients will be successfully treated? **[1.0]**
2. A tech company, which has recently launched a new product, experiences an influx of communication from customers and clients. On average, the company receives 3 emails per hour regarding product inquiries, feedback, and support requests. The marketing team is interested in analyzing the email traffic to enhance customer service and optimize response times.
  - a) What is the probability that the company receives exactly 5 emails in an hour? **[1.0]**
  - b) What is the probability that the company receives at least 3 emails in an hour? **[2.0]**
3. A customer service center answers calls, and it is known that 20% of calls are not resolved on the first attempt.

a) What is the probability that it takes at most 2 attempts to resolve the issue?  
[2.0]

b) What is the probability that the first call resolved after failing at least 1 time? [2.0]

4. A random variable X distributed as an exponential random variable with parameter  $(\lambda > 0)$ . The pdf of the exponential distribution is given by the formula:

$$f(x) = \lambda e^{-\lambda x}; x \geq 0.$$

Show that both mean and standard deviation of exponential distribution is  $\frac{1}{\lambda}$ . [5]