

Full Name: _____

Student No: _____

Grade:

For each answer, **provide a short argument.**

1. (3 points) Let X be a random variable with cumulative distribution function

$$F(x) := \mathbb{P}(X \leq x) = \begin{cases} 0 & \text{if } x < -1, \\ 0.2 & \text{if } -1 \leq x < 1, \\ 0.7 & \text{if } 1 \leq x < 3, \\ 1 & \text{if } 3 \leq x. \end{cases}$$

- (a) What is the probability that $0 \leq X \leq 1$?

Answer:

- (b) Find the probability mass function of X .

- (c) Find the expected value of X .

Answer:

2. (3 points) We repeat rolling a die until a 5 appears. Let N denote the number of rolls.

(a) What is the chance that $N > 5$?

Answer:

(b) What is the expected value of N ?

Answer:

(c) What is the expected value of $1/3^N$?

Answer:

3. (1 point) A bus carrying 10 passengers goes along a route with 7 designated stops. Each passenger gets off at a random stop, independently of the other passengers. Assuming that no new passenger enters the bus, what is the expected number of stops at which at least one passenger gets off of the bus?

[Hint: Introduce a Bernoulli RV for each designated stop.]

Answer: