Math 201, Spring 2020

Problem Set # 5

Due March 2, 2022 at 11:59pm on gradescope

Question 1. a) Let X be a nonnegative integer-valued random variable, i.e., it takes values in $\{0, 1, 2, ...\}$. Show that $E[X] = \sum_{k=1}^{\infty} P(X \geq k)$

b) Assume now that $X \sim \text{Geom}(1/3)$, use the formula from (a) to calculate $E[X]$.

Question 2. Buses arrive at ten minute intervals starting at noon. A man arrives at the bus stop a random number X minutes after noon, where X has distribution function

$$P(X \leq x) = \begin{cases} 0 & \text{if } x < 0, \\ x/60 & \text{if } 0 \leq x \leq 60 \\ 1 & \text{if } x > 60. \end{cases}$$

What is the probability that he waits less than five minutes for a bus?