

Math 201, Spring 2020

Problem Set # 10

Due April 15, 2022 at 11:59pm on gradescope

Question 1. Suppose that $X \sim \text{Geom}(p)$ and $Y \sim \text{Geom}(r)$ are independent. Find the probability $P(X < Y)$.

Question 2. Let $X \sim \text{Exp}(\lambda)$ and $Y \sim \text{Exp}(\lambda)$ be independent random variables. Let $t > 0$. Let A be the event that $X < Y$. Let B be the event that $\min(X, Y) > t$.

- (a) Find $P(A \cap B)$. (That is, find the change that $X < Y$ and $\min(X, Y) > t$). You may leave powers of e in your answer.
- (b) Are A and B independent? (That is, do we have $P(A \cap B) = P(A)P(B)$?) You may use the fact that if $T = \min(X, Y)$, then $T \sim \text{Exp}(\lambda + \lambda)$, proved in the book in Example 6.34. You may also use the formula proved in 6.33 for $P(X < Y)$.