

**MATH 464 (THEORY OF PROBABILITY)
HOMEWORK 5**

FALL 2017

Due on: Thursday 09-28-2017.

- (1) In successive rolls of a die, let X be the number of rolls until the first 6 appears. Determine the probability mass function of X .
- (2) A certain rare blood type can be found in only 0.05% of people. Use the **Poisson approximation** to compute the probability that at most two persons in a group of randomly selected 3000 people will have this rare blood type.
- (3) An airline company sells 200 tickets for a plane with 198 seats, knowing that the probability a passenger will not show up for the flight is 0.01. Use the **Poisson approximation** to compute the probability they will have enough seats for all the passengers who show up.
- (4) Let X be a Geometric random variable with parameter p , find the expected value of X , i.e., $\mathbb{E}(X)$.
- (5) Let X be a geometric random variable with parameter p . Prove that

$$P(X \geq m + n \mid X > m) = P(X \geq n)$$

for any positive integers m and n . Explain what it means, in terms of trials till the first success. This property is called the *memoryless property* of a discrete random variable (that takes values $1, 2, \dots$).