ENGR 0020 PROB & STAT FOR ENGINEERS I

Recitation Week 3

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Office Hour: Thursday 2:00 – 3:00pm, 1023 Benedum Hall

Goals:

1. To help to understand the lecture and homework questions.
2. To take quizzes for getting the feedback of the class. The quizzes will take 10 mins at the end of recitation.

1. **(Tossing for a head, Discrete distribution)** Suppose we do an experiment that consists of tossing a coin until a head appears. Let p be the probability of a head on any given toss, and define a random variable X as the number of tosses required to get a head. Find probability mass function and cumulative distribution function of X.

2. **(Continuous Distribution)** Consider the following joint probability density function of the random variables X and Y:

$$f(x,y) = \begin{cases} kxy, & 0 \le x, 0 \le y, x+y \le 2 \\ 0, & \text{elsewhere} \end{cases}$$

   (a) Determine the constant k.

   (b) Compute the probability $P(y < 1 | x < 1)$

3. **(mutually exclusive & independent)** A pair of events A and B are mutually exclusive with $P(A) > 0$ and $P(B) > 0$. Show they cannot be independent.

4. **(Independence)**Judge if the following pdf's are independent. Assume both random variable X and Y take values over $[0, 1]$. k is a constant.

   (a) $f(x,y) = kxy$

   (b) $f(x,y) = ky2^{x+y}$

   (c) $f(x,y) = c2^{xy}$

   (d)

$$f(x,y) = \begin{cases} kxy, & 0 \le x, 0 \le y, x+y \le 1 \\ 0, & \text{elsewhere} \end{cases}$$