ECS 315: In-Class Exercise #9

Solution

Date: 02/ 11 / 2017			
Name	ID (last 3 digits)		
Prapun	**5**	**5**	**5**

Instructions

1. Separate into groups of no more than three persons. Only one submission is needed for each group. **The group cannot be the same as any of your former groups.**
2. **Write down all the steps** that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.
3. **Do not panic.**

Consider the random variable specified in each part below.

i) Write down its (minimal) support.
ii) Write down its pmf.
iii) Find P[X < 1]
iv) Find P[1 < X ≤ 2]

The supports for all of these RVs contain 0, 1, ...
Therefore, $P[X<1] = P[X=0]$

All of these RVs are integer-valued.
Therefore, $P[1<X\leq 2] = P[X=2]$

		Support	pmf	P[X < 1]	P[1 < X ≤ 2]
(a)	$X \sim \text{Bernoulli}\left(\frac{1}{2}\right)$	$\{0,1\}$	$\begin{cases} 1-p, & x=0, \\ p, & x=1, \\ 0, & \text{otherwise.} \end{cases} \overset{p=1/2}{=} \begin{cases} 1/2, & x=0,1, \\ 0, & \text{otherwise} \end{cases}$	$1/2$	$0.$
(b)	$X \sim \text{Binomial}\left(4,\frac{1}{4}\right)$ $n=4, p=1/4$	$\{0,1,2,3,4\}$	$\begin{cases} \binom{4}{x}\left(\frac{1}{4}\right)^x\left(\frac{3}{4}\right)^{4-x}, & x=0,1,2,3,4 \\ 0, & \text{otherwise} \end{cases} = \begin{cases} 81/256 \approx 0.3164, & x=0, \\ 27/64 \approx 0.4219, & x=1, \\ 27/128 \approx 0.2109, & x=2, \\ 3/64 \approx 0.0468, & x=3, \\ 1/256 \approx 0.0039, & x=4, \\ 0, & \text{otherwise} \end{cases}$	$\frac{81}{256} \approx 0.3164$	$\frac{27}{128} \approx 0.2109$
(c)	$X \sim \text{Poisson}(1)$ $\alpha=1$	$\{0,1,2,\ldots\}$	$\begin{cases} e^{-\alpha}\frac{\alpha^x}{x!}, & x=0,1,2\ldots \\ 0, & \text{otherwise} \end{cases} \overset{\alpha=1}{=} \begin{cases} \frac{1}{ex!}, & x=0,1,2\ldots \\ 0, & \text{otherwise.} \end{cases}$	$\frac{1}{e} \approx 0.3679$	$\frac{1}{2e} \approx 0.1839$