EES 315: In-Class Exercise # 17

Date: 4 / 11 / 2020			
Name	ID (last 3 digits)		

Instructions

1. Work alone or in a group of no more than three students. **The group cannot be the same as any of your former groups after the midterm.**
2. Only one submission is needed for each group.
3. You have two choices for submission:
   (a) Online submission via Google Classroom
   - PDF only.
   - Only for those who can directly work on the posted files using devices with pen input.
   - Paper size should be the same as the posted file.
   - No scanned work, photos, or screen capture.
   - Your file name should start with the 10-digit student ID of one member. (You may add the IDs of other members, exercise #, or other information as well.)

   (b) Hardcopy submission
4. **Do not panic.**

Consider the random variable specified in each part below.

i) Write down its (minimal) support.

ii) Find $P[X=1]$. Your answer should be of the form 0.XXXX.

	(minimal) support	$P[X=1]$
$X \sim \mathcal{U}(\{-2,-1,3\})$ $X \sim \text{Uniform}(S)$	The minimal support of a uniform RV is the set S being specified. Here, $S = \{-2,-1,3\}$.	$p_X(x) = \begin{cases} \frac{1}{\lvert S \rvert}, & x \in S, \\ 0, & \text{otherwise.} \end{cases}$ Here, $\lvert S \rvert = 3$. Because $1 \notin S$, we have $P[X=0] = p_X(1) = 0 = 0.0000$.
$X \sim \text{Bernoulli}(0.2)$ $X \sim \text{Bernoulli}(p)$	The (minimal) support of any Bernoulli RV is $\{0,1\}$.	$p_X(x) = \begin{cases} 1-p, & x=0, \\ p, & x=1, \\ 0, & \text{otherwise.} \end{cases}$ Here, $p = 0.2$. $P[X=1] = p_X(1) = p = 0.2 = 0.2000$.
$X \sim \mathcal{B}\left(3, \frac{1}{4}\right)$ $X \sim \text{Binomial}(n,p)$	The (minimal) support of a Binomial RV is $\{0,1,\dots,n\}$. Here, $n=3$. Therefore, the (minimal) support is $\{0,1,2,3\}$.	$p_X(x) = \begin{cases} \binom{n}{x} p^x (1-p)^{n-x}, & x = 0,1,2,\dots,n, \\ 0, & \text{otherwise.} \end{cases}$ Here, $n=3$ and $p=\frac{1}{4}$. $p_X(x) = \begin{cases} \binom{3}{x}\left(\frac{1}{4}\right)^x\left(1-\frac{1}{4}\right)^{3-x}, & x = 0,1,2,3, \\ 0, & \text{otherwise.} \end{cases}$ Therefore, $P[X=1] = p_X(1) = \binom{3}{1}\left(\frac{1}{4}\right)^1\left(\frac{3}{4}\right)^{3-1}$ $= \left(\frac{3}{4}\right)^3 = \frac{27}{64} \approx 0.4219.$