

# ECS315 Quiz 3 Solution

Friday, September 19, 2014 10:01 AM

Suppose a RV  $X$  has pmf  $p_X(x) = \begin{cases} c/x, & x=1,2,3 \\ 0, & \text{otherwise.} \end{cases}$

sketch  $P[X \leq x]$  for  $x \in \mathbb{R}$ .

In lecture, we found that  $p_X(x) = \begin{cases} 6/11, & x=1, \\ 3/11, & x=2, \\ 2/11, & x=3, \\ 0, & \text{otherwise.} \end{cases}$

Note first that the RV  $X$  can only be 1, 2, or 3.

We may start by evaluating  $P[X \leq x]$  at many values of  $x$ .  
We then realize the following:

When  $x < 1$ ,  $P[X \leq x] = 0$  because the possible values for RV  $X$  are all  $\geq 1$

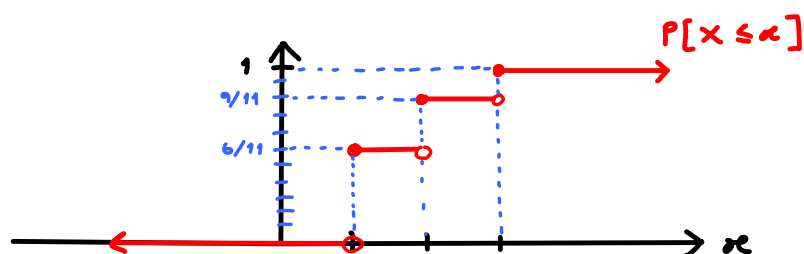
When  $1 \leq x < 2$ ,  $P[X \leq x] = \frac{6}{11}$  because only the event " $X=1$ " satisfies the condition " $X \leq x$ ".

When  $2 \leq x < 3$ ,  $P[X \leq x] = \frac{6}{11} + \frac{3}{11} = \frac{9}{11}$  because exactly two events " $X=1$ " and " $X=2$ " satisfy the condition " $X \leq x$ ".

When  $x \geq 3$ ,  $P[X \leq x] = 1$  because all possible values for RV  $X$  are now  $\leq x$ .

So,  $P[X \leq x] = \begin{cases} 0, & x < 1, \\ 6/11, & 1 \leq x < 2, \\ 9/11, & 2 \leq x < 3, \\ 1, & x \geq 3. \end{cases}$

Here is a sketch of  $P[X \leq x]$



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