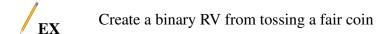
EEL 4930 Stats – Lecture 18

RANDOM VARIABLES (RVS)

XX 71 4			1	variable?
wnat	10	ล	random	variable /

•	We defi	ine a rar	idom v	variable is defined on a probability space (S, \mathcal{F}, P) as a	1
	from	2 to	3		



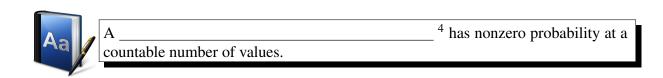


Create a binary RV from tossing a fair coin twice



Create another RV from tossing a fair coin twice

DISCRETE RANDOM VARIABLES



PROBABILITY MASS FUNCTION



For a discrete RV, the *probability mass function* (pmf) is

EX: Roll a fair 6-sided die

X= # on top face

$$P(X = x) = \begin{cases} 1/6, & x = 1, 2, \dots, 6 \\ 0, & \text{o.w.} \end{cases}$$

EX: Flip a fair coin until heads occurs

X = # of flips

$$P(X = x) = \begin{cases} \left(\frac{1}{2}\right)^x, & x = 1, 2, \dots \\ 0, & \text{o.w.} \end{cases}$$

CUMULATIVE DISTRIBUTION FUNCTION



- $F_X(x)$ is also sometimes called the *probability distribution function (PDF)*, but I will avoid this terminology to avoid confusion with another function we will use, called the probability density function (pdf)
- $F_X(x)$ is a prob. measure
 - Thus $F_X(x)$ inherits all the properties of a probability measure (axioms and corollaries still apply)

NOTES L18-4



Find and plot the cdfs for the previous two examples

Notes

¹function ${}^{2}S$ ${}^{3}\Re$ ⁴discrete random variable 5 cdf 6 ${$

 $^{^{6}}F_{X}(x)$