ELEG 310 Chap 4 3/19

Random Variables X Y Z N

pmf $p_N(k) = P(N=k)$ = number

RV outcome

1. $p(k) \geq 0$
2. $\sum_k p(k) = 1$

Ex. $p(k) = ck$ $k = 1, 2, \ldots, 6$

What is c?

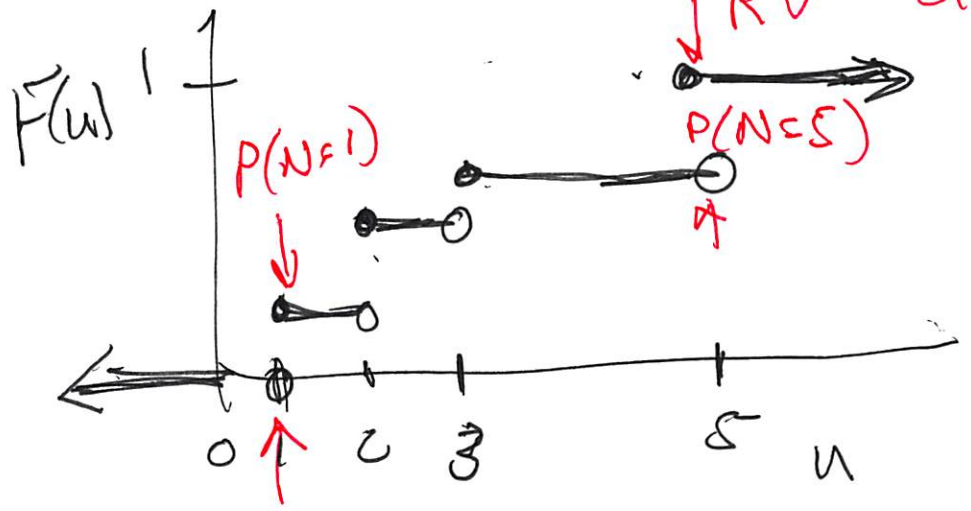
$1 = \sum p(k) = 1c + 2c + 3c + \ldots + 6c$

$= c(1+2+\ldots+6) = c\,\frac{6 \cdot 7}{2} = 21c$

$\Rightarrow c = \frac{1}{21}$

CDF $F_N(u) = P(N \le u)$ $\quad -\infty < u < \infty$

RV cts parameter



Expected Values

EX = probabilistic average of X

$= \sum_K K\, p(K)$

Ex. $EN = 1\cdot\frac{1}{6} + 2\cdot\frac{1}{6} + 3\cdot\frac{1}{6} + \cdots 6\cdot\frac{1}{6} = 3.5 = \mu$

Variance $\sigma^2 = Var(N) = E(N-\mu)^2 = E(N^2) - \mu^2 =$

$$E N^2 = 1^2 \cdot \frac{1}{6} + 2^2 \frac{1}{6} + \cdots + 6^2 \frac{1}{6} = \cdots$$

$$\mathrm{Var}(N) = \frac{(6-1)(6+1)}{12}$$

Chebyshev's Inequality

$$P(|X-\mu| > \varepsilon) \leq \frac{\mathrm{Var}(X)}{\varepsilon^2} \qquad \mu = E(X)$$

Lottery ticket $w = \text{win}$ $p = \text{Prob}(\text{win})$

e.g. $EX = \frac{999}{1000}(-1) + \frac{1}{1000} 500 = -.50$