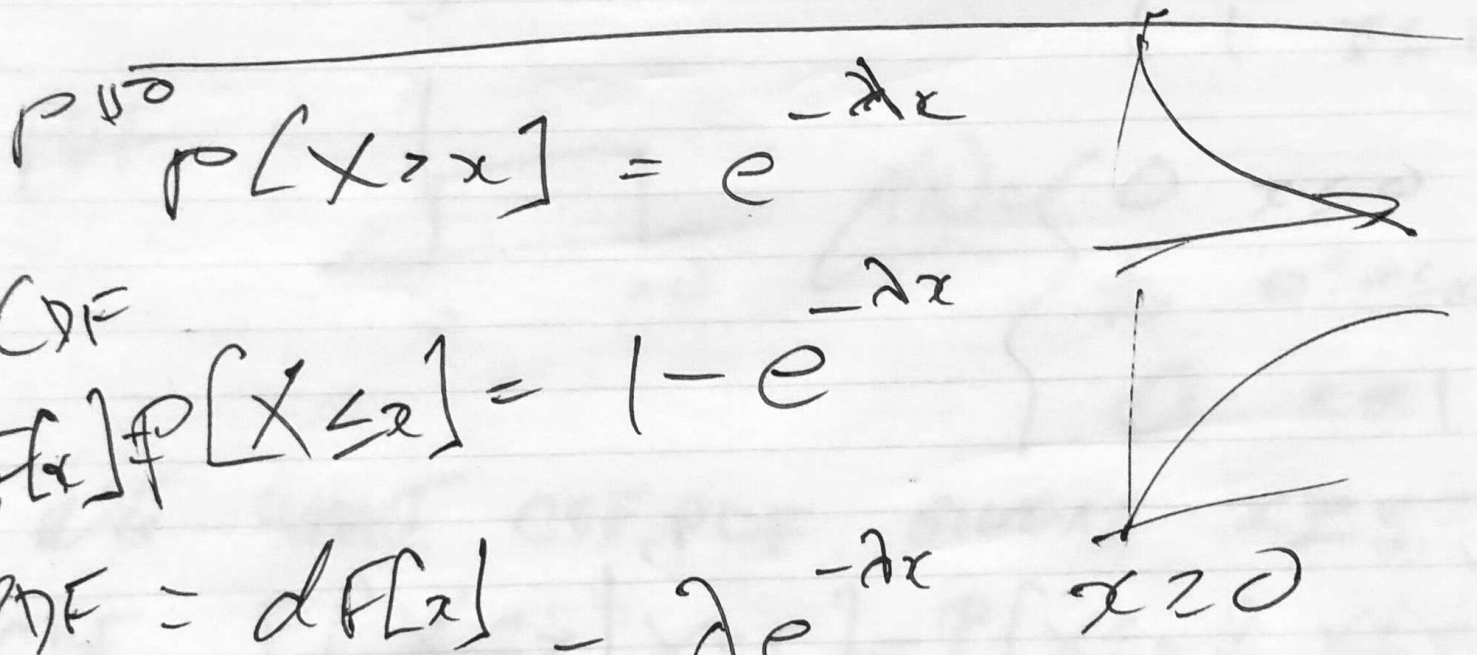


2/25/19 - (



PDF  
 $P[X > x] = e^{-\lambda x}$

CDF  
 $F(x) = P[X \leq x] = 1 - e^{-\lambda x}$

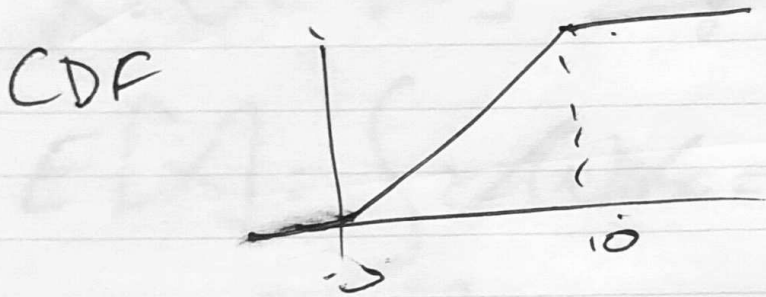
PDF =  $\frac{dF(x)}{dx} = \lambda e^{-\lambda x}$

$P[x < X < x+dx] = \int f(x) dx$

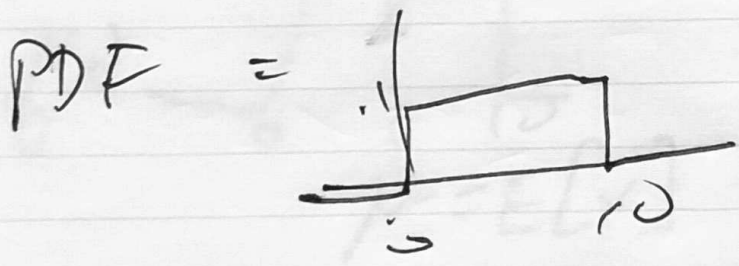
$f(x) = \lambda e^{-\lambda x}$

INTERARRIVAL  
TIMES

CONDITIONAL PROB FOR CONTIN,  
UNIFORM [0, 10]



$$F(x) = \begin{cases} 0 & x < 0 \\ \frac{x}{10} & 0 \leq x \leq 10 \\ 1 & x \geq 10 \end{cases}$$

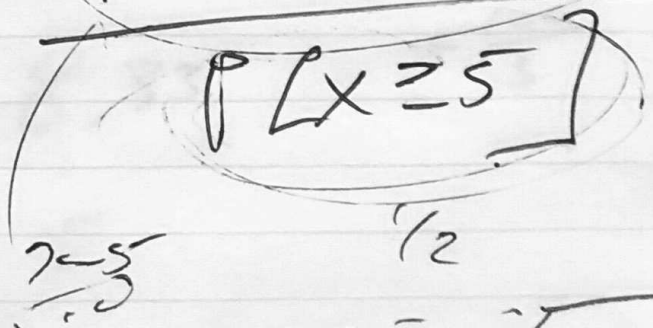


$$f(x) = \begin{cases} 0 & x < 0 \\ \frac{1}{10} & 0 \leq x \leq 10 \\ 0 & x \geq 10 \end{cases}$$

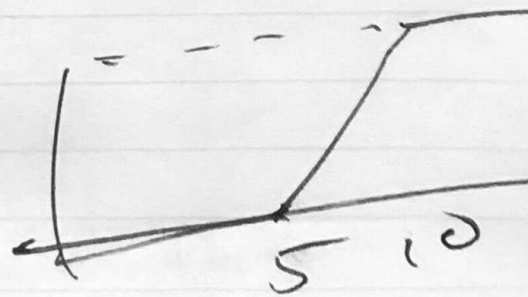
WE WANT CDF, PDF GIVEN  $x \geq 5$

CDF  $P[X \leq x | X \geq 5] = \frac{P[X \leq x \ \& \ X \geq 5]}{P[X \geq 5]}$

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$



$$P[X \leq x | X \geq 5] = \begin{cases} 0 & x < 5 \\ \frac{x-5}{5} & 5 \leq x \leq 10 \\ 1 & x \geq 10 \end{cases}$$

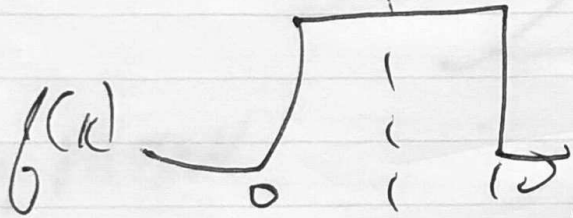


3

$$4.3 \quad E[X] = \int x f(x) dx$$

$$X: U[0, 10] \quad f(x) = \frac{1}{10} \quad 0 \leq x \leq 10$$

$$E[X] = \int_0^{10} x f(x) dx = \int_0^{10} \frac{x}{10} dx = \frac{1}{10} \left. \frac{x^2}{2} \right|_0^{10}$$



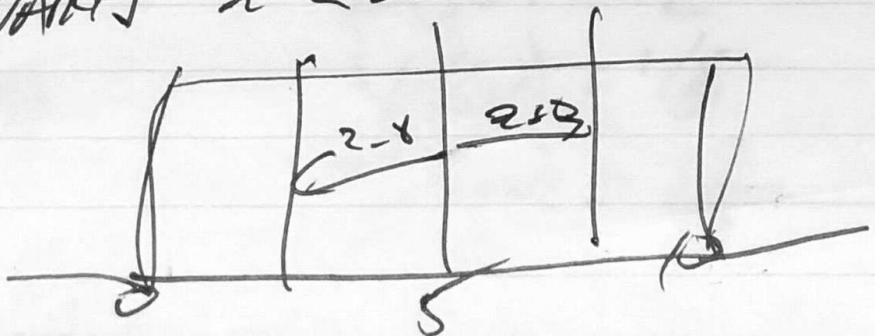
$$\mu = E[X]$$

$$VAR[X] = E[X^2] - (E[X])^2$$

$$E[X^2] = \int_0^{10} x^2 f(x) dx = \int_0^{10} \frac{x^2}{10} dx = \frac{1}{10} \left. \frac{x^3}{3} \right|_0^{10}$$

$$VAR[X] = \frac{100}{3} - 25 = 8.33 \quad \left( \frac{100}{3} \right)$$

$$STDEV[X] = \sqrt{VAR[X]} \approx 2.8$$



# NORMAL - OTHERS CONVERGE

TO IT AS  $N \rightarrow \infty$

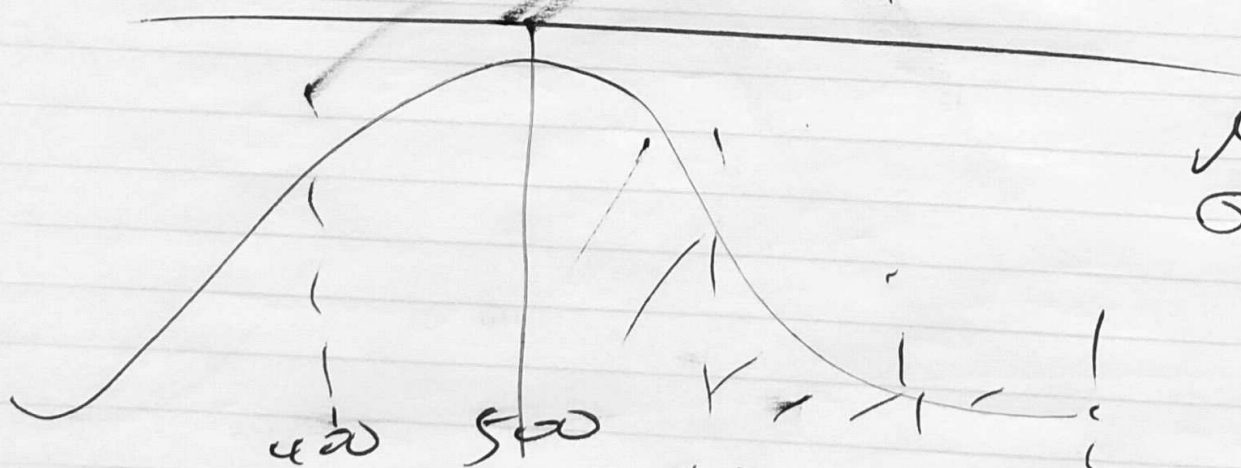
ex. BINOMIAL  $\binom{N}{k} p^k q^{N-k}$



ex. POISSON

$$\mu = Np$$

$$VAR = Npq$$



$\mu = 500$   
 $\sigma = 100$

$\Psi(x) =$  RIGHT TAIL

$$\Psi(x) = \int_x^{\infty} f(x)$$

- $\Psi(500) = 1/2$
- $\Psi(600) = 1/6$
- $\Psi(400) = 5/6$

$\Psi(700) = .92$