3/11/19 - 1

MARKOV

IT SNOWS ON AVERAGE 10 DAYS IN MARCH.

WHAT'S PROB IT SNOWS $\geq$ 15 DAYS?

$E[X] = 10$

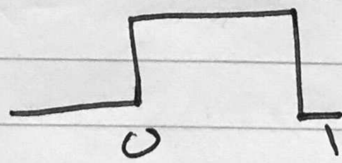
$P[X \geq 15] \leq \frac{10}{15} = \frac{2}{3}$

RELIABILITY

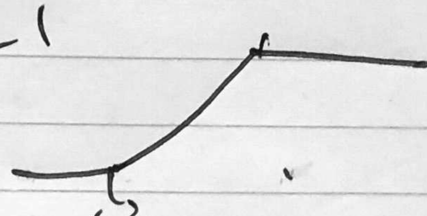
X : R.V FOR WIDGET LIFETIME

$X : U[0,1]$

PDF $f(x) = 1$



CDF $F(x) = x \; , \; 0 \leq x \leq 1$



R(X) : PROB WIDGET STILL ALIVE @ X.

$R(x) = \begin{cases} 1 - x \; , & 0 \leq x \leq 1 \\ 0 \; , & x \geq 1 \end{cases}$

$= 1 - F(x)$

MTTF = MEAN TIME TO FAILURE

$$= E[t] = \int x f(x)\,dx$$

MTTF = .5 FOR $U[0,1]$

FAILURE RATE $r(x)$

$r(x)dx$ = PROB OF FAILING IN next

$$x \le X \le x + dx$$

GIVEN IT HASN'T YET FAILED

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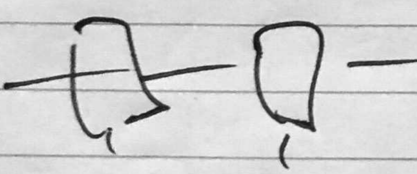
$R(t)$ = PROB STILL WORKING @ TIME t



$R_1(t)$ = PROB C_1 ....

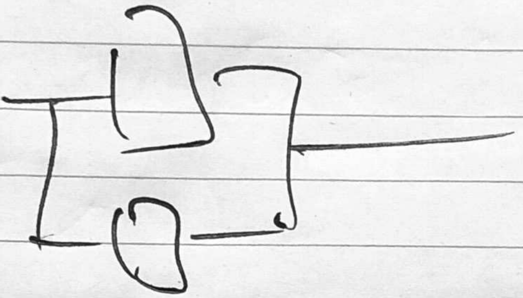
WHOLE SYSTEM WORKING REQUIRES BOTH COMPONENTS

$$R(t) = R_1(t)\,R_2(t)$$

EXPON. $R_1(t) = e^{-\lambda t} = R_2(t)$

$$R(t) = e^{-\lambda t} e^{-\lambda t}$$
$$= e^{-2\lambda t}$$

PARALLEL



WANT PROB AT LEAST 1 SUBSYSTEM WORKING @ t

= 1 − PROB BOTH DEAD.

$R_1(t)$ = PROB STILL WORKING

$1 - R(t)$: " DEAD.

PROB WHOLE SYSTEM DEAD

$$= (1 - R_1(t))(1 - R_2(t))$$

PROB WHOLE SYST WORKING

$$R(t) = 1 - (1 - R_1(t))(1 - R_2(t))$$

2 R.V.

TOSS UNFAIR COIN TWICE

1st X		
2nd TOSS Y	H(1)	T(0)
H	4/9	2/9
T	2/9	1/9

	X 0	1
Y 0	1/9	2/9
1	2/9	4/9

$f(H,T) = 2/9$

$f(1,0) = 2/9$

CDF $F(X \leq x, Y \leq y)$

$F(1,0) = 3/9$

SUM DOWN PMF TABLE OR SUM ACROSS TO GET MARGINAL DIST

THIS IS BACK TO 1 VAR. $f_x(1) = 2/3$

MORE COMPLICATED CDF

$f_x(0) = \frac{1}{2} = f_x(1)$

	X 0	1	
Y 0	1/3	1/6	→ 1/2
1	1/6	1/3	

$f_y(0) = f_y(1) = \frac{1}{2}$