all

2/19/19

REV 4 $\binom{3}{1} \cdot 6^2 \cdot 4$

5/ 18 RED $P(\text{RED}) = \frac{18}{38}$

18 BLACK $P(\text{BLACK}) = \frac{18}{38}$

2 d00 $P(\text{d00}) = \frac{2}{38}$

$$\binom{38}{1\ 1\ 1} \left(\frac{18}{38}\right)\left(\frac{18}{38}\right)\left(\frac{2}{38}\right)$$

$$\frac{38!}{1!1!1!}$$

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6 A: PICK 6-SIDED $P(A) = \frac{1}{2}$

B: TOSS 2

$P(B|A) = 1/6 \qquad P(B|A') = \frac{1}{12}$

$P(B \& A) = P(B|A)P(A) = \frac{1}{6}\frac{1}{2} = \frac{1}{12}$

$P(B) = P(B|A)P(A) + P(B|A')P(A')$

$\frac{1}{12} \quad \frac{1}{12}\frac{1}{2} \quad = \frac{1}{8}$

WANT $P(A|B)$?

$P(A|B)\,P(B) = P(A \& B)$

$\frac{1}{8}$ $\frac{1}{12}$

$P(B|A) = \frac{1/12}{1/8} = \frac{2}{3}$

WHAT IS PROB I PICKED THE CUBE GIVEN I THREW 10?

7 HOW MANY TOSSES TO SEE 2

$P(B) = \frac{1}{2}$ $E[\text{TOSS}] = 2$

GEOMETRIC

8 $P(\text{EVEN}) = \frac{1}{2}$ $P(\text{M3}) = \frac{1}{3}$

EVEN + M3 = {6, 12} $P = \frac{1}{6} = \frac{1}{2} \cdot \frac{1}{3}$

INDEP

8b) $S = \{1, 2, \ldots 10\}$

$E = \{2, 4, 6, 8, 10\}$ ~~$P = \frac{1}{2}$~~)

$M3 = \{3, 6, 9\}$ $P = \frac{3}{10}$

$EVEN \cap M3 = \{6\}$ ~~$P = \frac{1}{10}$~~ $P = \frac{1}{10}$)

~~$\frac{1}{10} \neq \frac{3}{10} \times \frac{1}{10}$~~ ⇒

$\frac{1}{2} \cdot \frac{3}{10} \neq \frac{1}{10}$ DEPENDENT

Book 2.99 $P(BAD) = .05$

NEED 8 GOOD CHIPS

SUPPOSE IT TAKES EXACTLY N CHIPS.

OF 1ST N-1 CHIPS: 7 GOOD, N-8 BAD

$$PROB = \binom{N-1}{7} .95^7 \times .05^{(N-8)}$$

× PROB N^{th} GOOD : .95

$$PROB = \binom{N-1}{7} .95^8 \times .05^{(N-8)}$$

PROB I NEED EXACTLY N CHIPS TO GET 8 GOOD IS

$$\binom{N-1}{7} \cdot .95^8 \cdot .05^{(N-8)}$$

WHAT IS N SO THAT IS $\geq .9$?
JUST TRY DIFFERENT N.

BOOK 3.5 - P130

IF A TRIES, THEN $\frac{1}{2}$ OF TIME B ALSO TRIED, SO BOTH FAIL

$P(\text{SUCCEED}) = \frac{1}{2}$ $\quad E[\#\text{TRIES}] = 2$.

CLICK 1

$9 \cdot 10^{-10}$

2 $p = 10^{-10}$

$$P(2 \text{ BAD OF } 9) = \binom{9}{2} p^2 q^7$$

$$= 36 \times 10^{-20} \times \underbrace{((1-10^{-10})^7}_{=1}$$

CHAP 4

CONTINUOUS + MIXED DISTRIBS.

FOR CONTIN, HAVE pdf

pdf = PROB DENSITY FN $f_X(x)$

$f(x)\,dx = P[x \le X \le x+dx]$

ex. X: UNIFORM $[0, 100]$

$f_X(x) = .01 \quad ; \quad 0 \le x \le 100$

~~$P[50 \le X \le 60] = \int_{50}^{60} f(x)\,dx = .1$~~

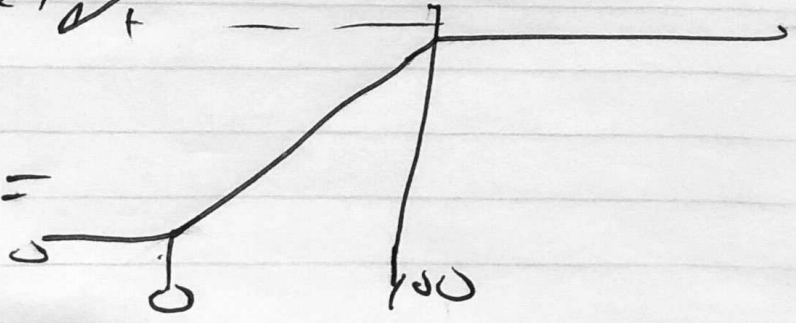
$P[50 \le X \le 60] = \int f(x)\,dx = .01 \times 10 = .1$

$P[1 \le X \le 5] = .01 \times 4 = .04$

DEFINE CUMULATIVE DIST FN

$$F_X(x) = \int_{-\infty}^{x} f(y)\,dy$$

$$F(x) = \int .01\,dy =$$



FOR CONTINUOUS, PROB THAT X IS EXACTLY ONE SPECIFIC VALUE IS 0. YOU HAVE TO TALK ABOUT PROB OF A RANGE ~~P[a=6~~.

$P[a \leq x \leq b]$

"$\leq$" OR "$<$" GIVE SAME ANSWER HERE. (NOT FOR DISCRETE DIST).

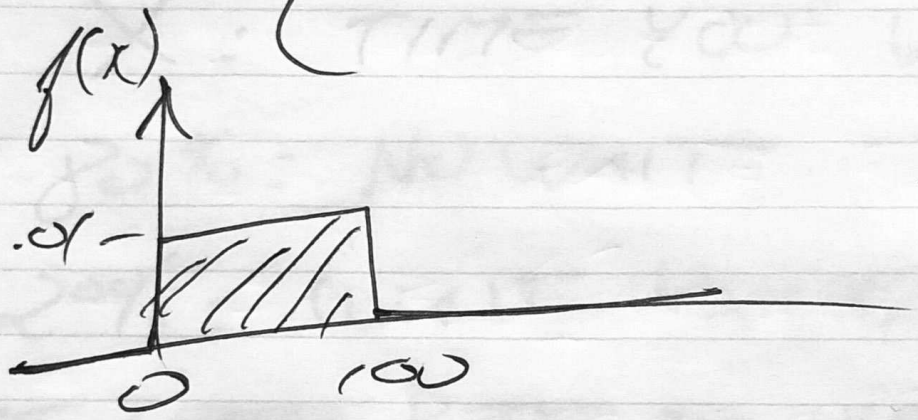
$P[50 \leq x \leq 60] = P[50 \leq x < 60]$

FOR CONTINUOUS DIST.

$P[x \leq X \leq x + dx] = f_X(x)\,dx$

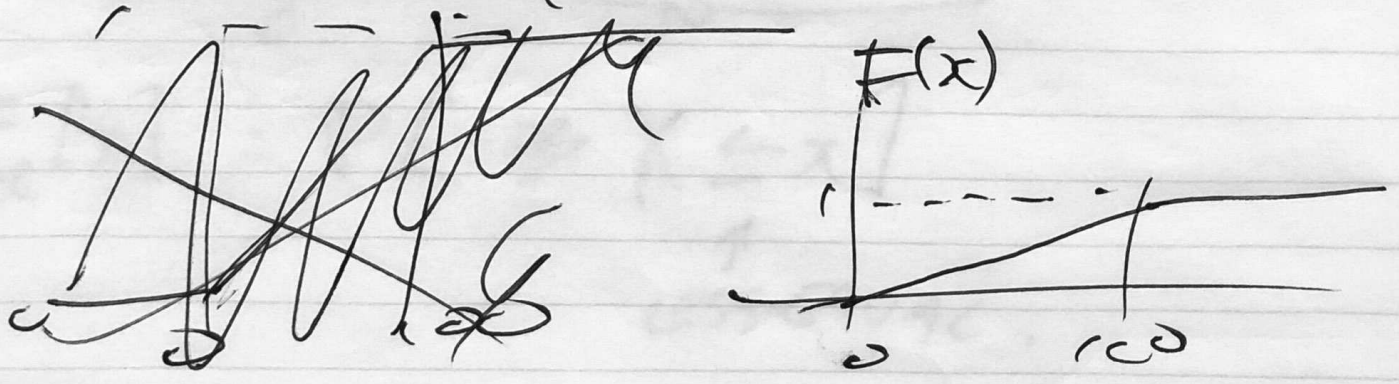
~~CDF~~

$$f(x) = \begin{cases} .01 & \text{IF } 0 \le x \le 100 \\ 0 & \text{OTHERWISE} \end{cases}$$



CUMULATIVE $F_x(x_0) = \int_{-\infty}^{x_0} f_x(x)$

$$F(x) = \begin{cases} 0 & \text{IF } x \le 0 \\ .01x & \text{IF } 0 \le x \le 100 \\ 1 & \text{IF } x \ge 100 \end{cases}$$



U[0,100]

MIXED DIST

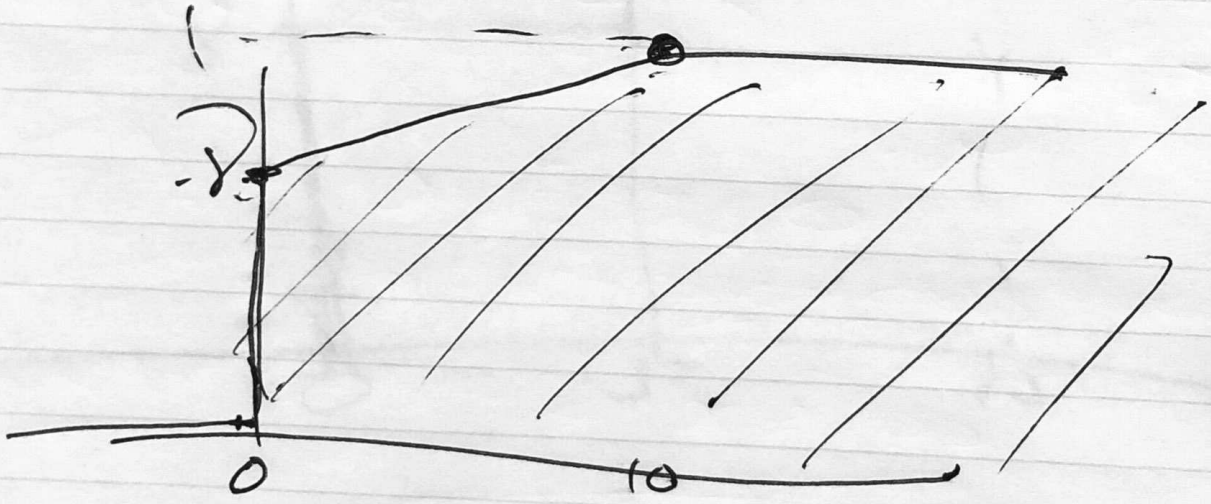
9). WAIT FOR TAXI

R.V. X: TIME YOU WAIT.

80%: NO WAIT

20%: WAIT UNIFORM $[0, 10]$

~~HERE NEED~~ BEST TO USE CDF



$F_X[x] = P[X \leq x]$

↑ LESS-EQUAL.

NEW TAXI EXAMPLE

- 80% NO WAIT
- 10% WAIT 5 MIN
- 10% WAIT UNIFORM; 5-10