Stony Brook University

Probability Introduction

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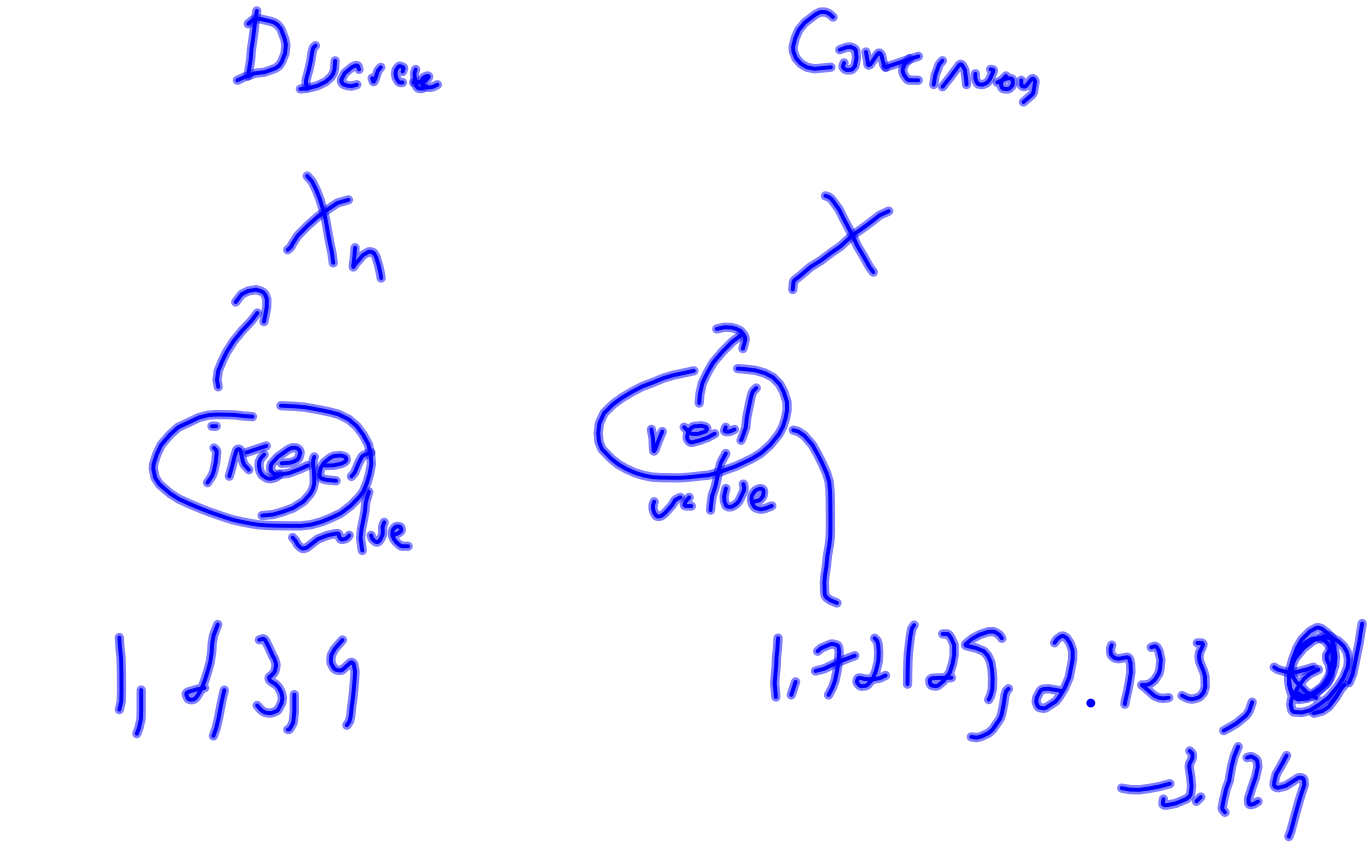
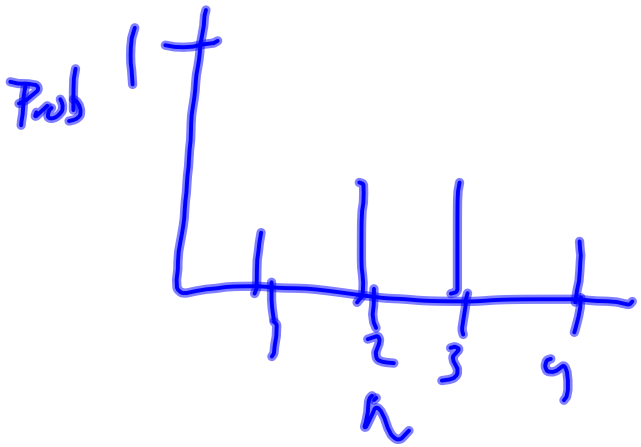
Electrical & Computer Engineering

1. Random Variables



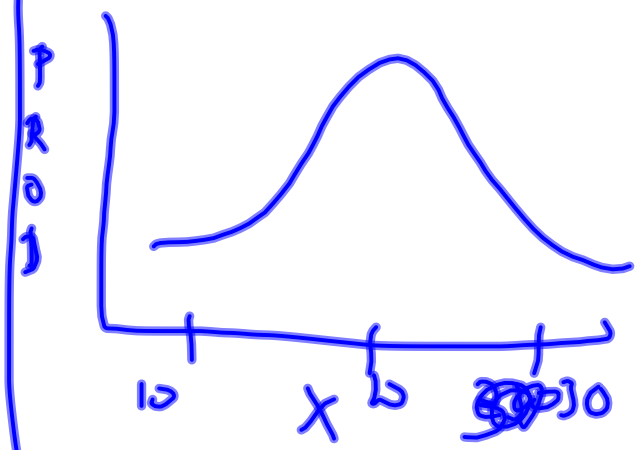
2, Discrete

Prob Mass Func. (PMF)



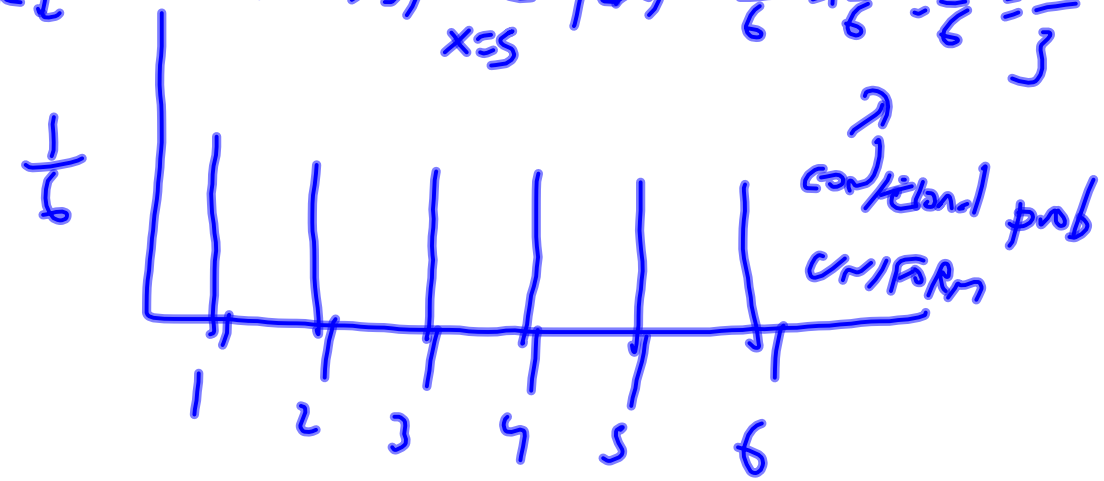
Continuous

Prob Density Function (PDF)



3. DICE

$P(X \geq 5) = \sum_{x=5}^{6} p(x) = \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$



DISC

$p(x) \geq 0$

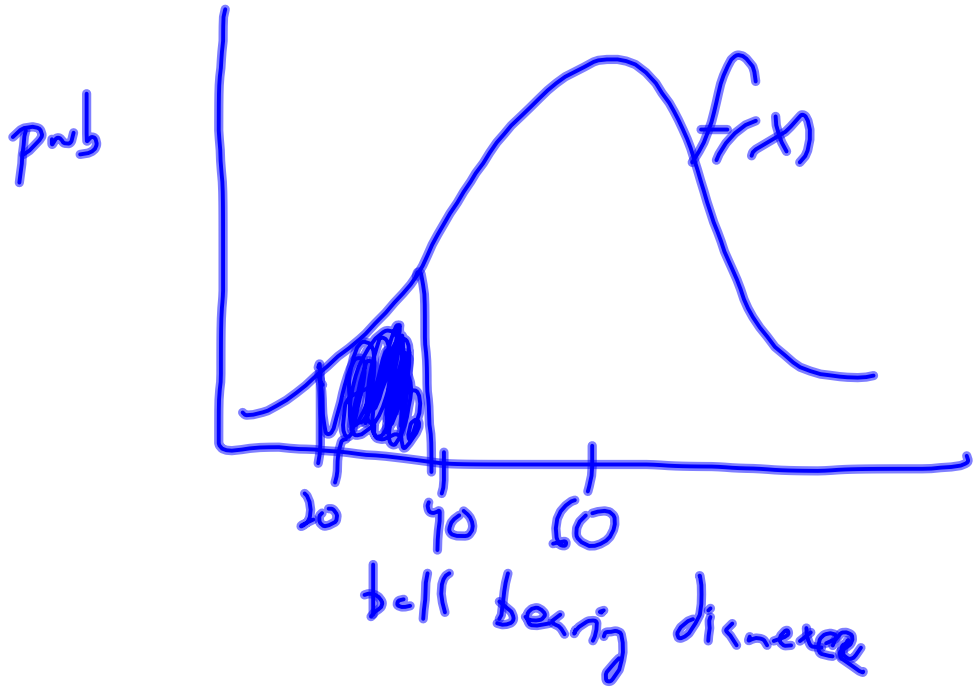
$\sum_x p(x) = 1$

CONT

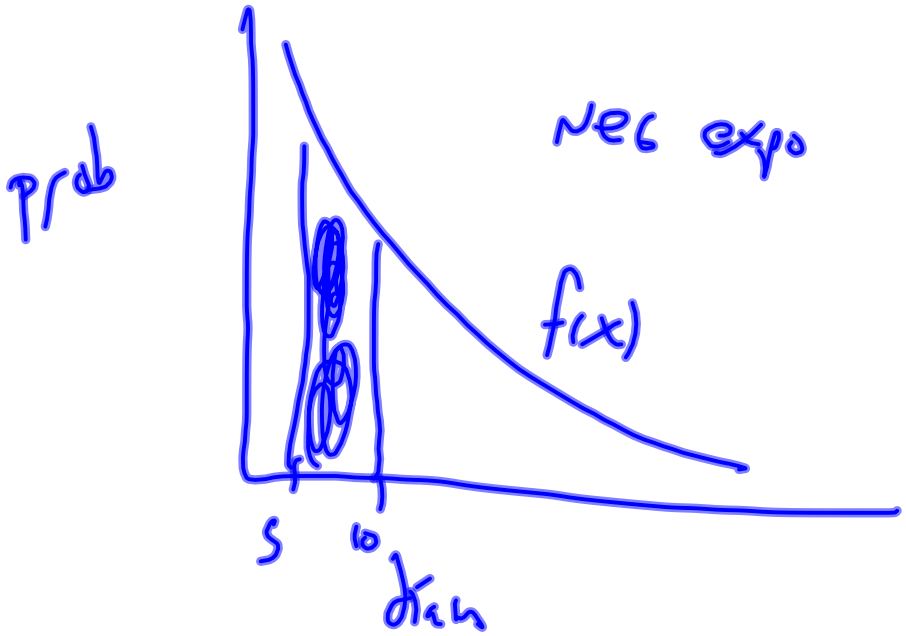
$f(x) \geq 0$

~~$\int f(x)dx = 1$~~

$\int_{-\infty}^{\infty} f(x)dx = 1$



$$P(20 < \text{diameter} < 40) = \int_{20}^{40} f(x)\,dx$$



$$P(5 \le \text{dist} \le 10) = \int_5^{10} f(x)\,dx$$

4.

. disc

$$\mu = E[n] = \sum_n n p_n$$

$$E[n^2] = \sum_n n^2 p_n$$

$$E[h(n)] = \sum_n h(n) p_n$$

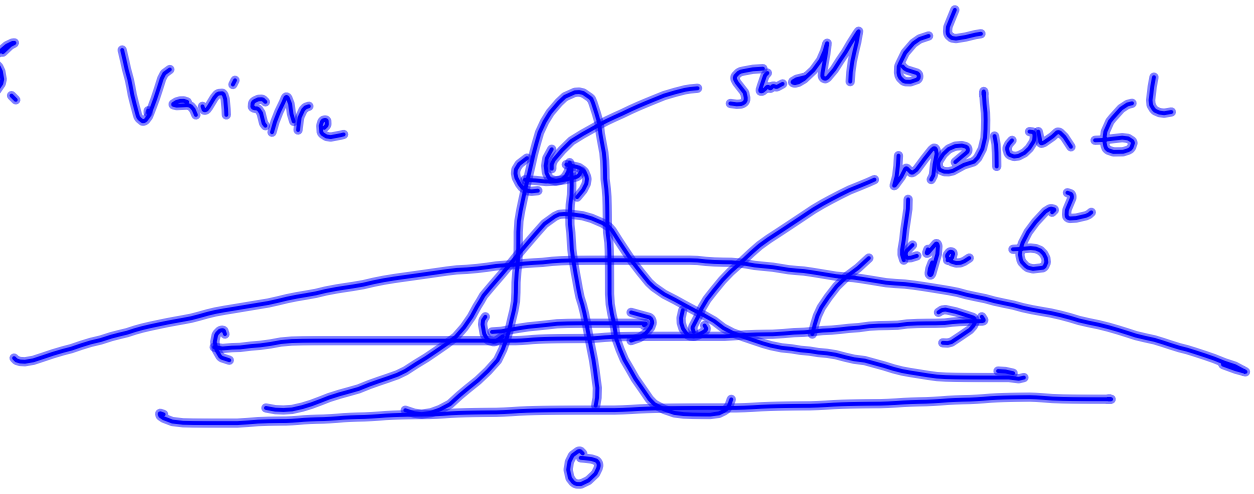
cont

$$\mu = E(x) = \int_x x f(x)\,dx$$

$$E(x^2) = \int_x x^2 f(x)\,dx$$

$$E(h(x)) = \int_x h(x) f(x)\,dx$$

5. Variance



$$Var(X) = \sigma^2 =$$

$$\sum_h (h-m)^2 p(h) \qquad \int_x (x-m)^2 f(x)\,dx$$

Disc Cont

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

$$= E(X^2) - \mu^2$$

6.

$p(x,y)$ joint dist

marginal dist

$$p(x) = \int p(x,y)\, dy$$

$$p(y) = \int p(x,y)\, dx$$