



X -> vandom variable

02)

var(x) = E [(x - E(x)2)

To prove var (x) = E[x2] - Ex)2

Given that:

Var (x) = E[(x - E(x))<sup>2</sup>]

 $= E[x^2 - 2XE[X] + E[X]^2]$   $= E[x^2] - 2E[XE[X]] + E[X]^2$ 

= E(x2] - 2E[x]2 + E[x]2

 $= \mathbb{E}[X^2] - \mathbb{E}[X]^2 - \mathbb{O}$ 

E[X] = 0 and  $E[X^2] = 1$ .
To find i) variance of X.

2) If  $y = a + b \times$ , var(y) = 9.

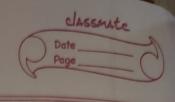
 $2) \quad \exists \quad \forall = a. + bx, \quad \forall ax(y) = 1$ 

 $\frac{1}{\sqrt{2}} \sqrt{2} \left( \frac{1}{\sqrt{2}} \right)^2 = \frac{1}{\sqrt{2}} \left( \frac{1}{\sqrt{2$ 

 $E[Y^2] = E[(a+bX)^2]$   $= E[a^2 + 2abX + b^2X^2]$ 

= 12+ 2ab E[x] + 6° E[x2" = a2 + 2ab (0) + 6°(1)

E[42] = 02+62/



E[Y] = E[a+bX] = a +bE(x) = a + b(0)E[Y] = a

Var (4) = E[42] - E[4]2  $= a^2 + b^2 - a^2$ var (4) = 62

(3) Let A be the event that " is a winning horse"! Let ~ A be the event that " " Aku predicts that the given horse is not a winning horse

> Sinularly, let & be the event that the given horse wins and abbe the Event that given horse does not min.

a) epiren a horse, the probability that it wine is. P(B) = P(B, A) + P(B, ~A) = P(B/A) P(A) + P(B/~A) P(~A) = 0.99×10<sup>-5</sup> + (1-0.99 99) x(01-10<sup>-5</sup>) P(B) = 1.991×10<sup>-5</sup> — D

b) Probability that Anu predicts that the black beauty is winning P(A/B) = P(A/B) = P(A/B)P(A)

P(B)

P(B)

0.99×10

1.99×10

1.99×10 HAB 0.497 MILLIAND LANDS LINES INTO DRAWN O. WILL SINGER CODMONICE