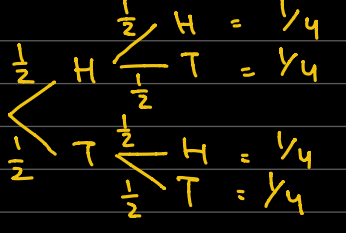
DISCRETE RANDOM VARIABLES

Two types

Binomial — Normal / Non-binomial

NORMAL / NON-BINOMIAL

Example: tossing a coin twice



$P(HH) = \frac{1}{4}$

$P(HT) + P(TH) = \frac{1}{2}$

$P(TT) = \frac{1}{4}$

let X = no. of heads obtained when a fair coin is tossed twice

X can be 0, 1, 2

x^2	0	1	4
X	0	1	2
P(X)	1/4	1/2	1/4

→ Probability distribution table

Q.i) find mean of X

↳ stands for "expected"

$E(x) = \Sigma x \cdot P(x)$

$= (0 \times \frac{1}{4}) + (1 \times \frac{1}{2}) + (2 \times \frac{1}{4})$

$= 1$ → means that on average, I expect to get 1 head when I toss the coin twice

ii) find variance of X

$Var(X) = E(x)^2 - (E(x))^2$

$= [(0 \times \frac{1}{2}) + (1 \times \frac{1}{2}) + (4 \times \frac{1}{4})] - (1)^2$

$= \frac{3}{2} - \frac{2}{2}$

$= \frac{1}{2}$

Standard Deviation is the sq. root of the variance

but what is the variance?
Variance is the spread of the data

ie. 1, 2, 3 vs. 1, 4, 8

lower variance
less spread out

higher variance
more spread out

Standard deviation is a different measure of the same thing (spread of the dat

Note: Mean of a frequency distribution table

Example

x^2	1	4	9	16	25
x	1	2	3	4	5
f(x)	16	8	4	2	2

Mean $\rightarrow$ $E(X) = \bar{x} = \frac{\Sigma fx}{\Sigma f} = 1.94$

Variance $\rightarrow$ $Var(x) = \frac{\Sigma f x^2}{\Sigma f} - (E(X))^2$

$$= \frac{(16\times1) + (8\times4) + (4\times9) + (2\times16) + (2\times25)}{32} - (1.937)^2$$

Homework: Do the following questions:
14, 40, 41, 45, 44, 48, 55, 62, 61