Mean and Variance on RV

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Example - toss 3 coins at a time and find the probability of getting head

3 toss			Head
H	H	H	3
H	H	T	2
H	T	H	2
H	T	T	1
T	H	H	2
T	H	T	1
T	T	H	1
T	T	T	0

Discrete Prob. table →

n	0	1	2	3	(Head)
P(X=n)	1/8	3/8	3/8	1/8	

$$\text{Mean (R.V)} = \Sigma n \times P(n)$$

$$= 0\times\frac{1}{8} + 1\times\frac{3}{8} + 2\times\frac{3}{8} + 3\times\frac{1}{8}$$

$$= 0 + \frac{3}{8} + \frac{6}{8} + \frac{3}{8}$$

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

$$\text{variance R.V} = \Sigma[n^2 \times P(n)] - \mu_n^2$$

$$= \left[0^2\times\frac{1}{8} + 1^2\times\frac{3}{8} + 2^2\times\frac{3}{8} + 3^2\times\frac{1}{8}\right] - \left[\frac{3}{2}\right]^2$$

$$= \frac{3}{8} + \frac{12}{8} + \frac{9}{8} - \frac{9}{4}$$

$$= \frac{24}{8} - \frac{9}{4}$$

$$= \frac{6}{8}$$

$$4^2 = \frac{3}{4}$$