Class 29

Wednesday, August 18, 2021 9:58 PM

P-1

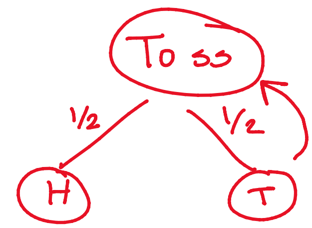
$$\frac{1+2+3+4+5+6}{6}$$

$$= 3.5$$

$$\left(\frac{1}{6}\right)^3 \rightarrow \frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}$$

P-2 H

x — Exp number of toss to get a head.



$$H = 1\cdot\left(\tfrac{1}{2}\right)^1 = \tfrac{1}{2}$$
$$+$$
$$TH = 2\cdot\left(\tfrac{1}{2}\right)^2 = \tfrac{2}{4}$$
$$+$$
$$TTH = 3\cdot\left(\tfrac{1}{2}\right)^3 = \tfrac{3}{8}$$
$$+$$
$$TTTH = 4\cdot\left(\tfrac{1}{2}\right)^4 = \tfrac{4}{16}$$
$$+$$
$$\vdots \quad = k\left(\tfrac{1}{2}\right)^k$$

$$\overline{} = 2$$

$$x = \underbrace{\tfrac{1}{2}(1+0)} + \underbrace{\tfrac{1}{2}(1+x)}$$

$$\Rightarrow x = \frac{1}{2} + \frac{1}{2} + \frac{x}{2} = 1 + \frac{x}{2}$$

$$\Rightarrow \frac{x}{2} = 1 \quad \boxed{\therefore x = 2}$$

$$\frac{1}{2} + \frac{2}{4} + \frac{3}{8} + \frac{4}{16} + \frac{5}{32} + \cdots + \frac{k}{2^k}$$

— o —

P-3

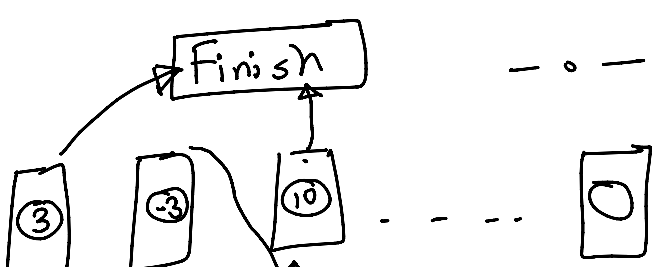
$$E(\text{2 heads in total}) = \frac{1}{2}\left(1 + E(1H)\right) + \frac{1}{2}\left(1 + E(2H)\right)$$

$$\Rightarrow x = \frac{1}{2}(1+2) + \frac{1}{2}(1+x) = 1.5 + 0.5 + \frac{x}{2}$$
$$= 2 + \frac{x}{2}$$

$$\therefore \frac{x}{2} = 2 \quad \boxed{\therefore x = 4}$$

— o —

P-4



3   -6   -9

$$E(\text{Finish}) = \frac{1}{3}(3+0) + \frac{1}{3}(6+E(\text{finish})) + \frac{1}{3}(9+E(\text{finish}))$$

$$x = \frac{1}{3}(3+6+9+2\cdot x)$$

$$\Rightarrow 3x = 18+2x$$

$$\Rightarrow x = 18$$

$$x = \frac{1}{n}\left(\sum_{i=0}^{n-1}|a_i| + Nx\right)$$

$$= \frac{1}{n}\sum_{i=0}^{n-1}|a_i| + \frac{N}{n}x$$

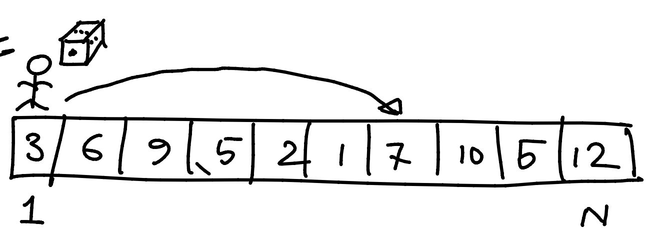
$$x\left(1-\frac{N}{n}\right) = \frac{1}{n}\sum|a_i| \Rightarrow \left(\frac{n-N}{n}\right)x = \frac{1}{n}\sum|a_i|$$

$$\frac{18}{3-2} = \frac{18}{1}$$

$$(n-N)x = \sum|a_i|$$

$$x = \frac{\sum|a_i|}{n-N}$$

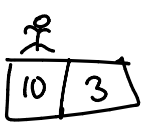
P-5



T1:

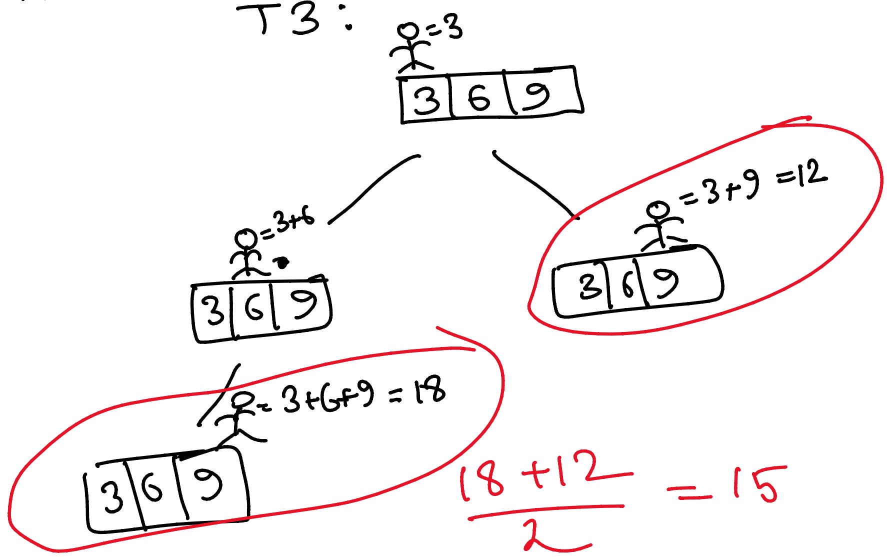
$E(cnt) = 101$

T2:

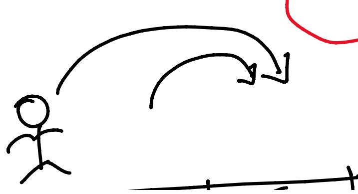


$E(cnt) = 13$

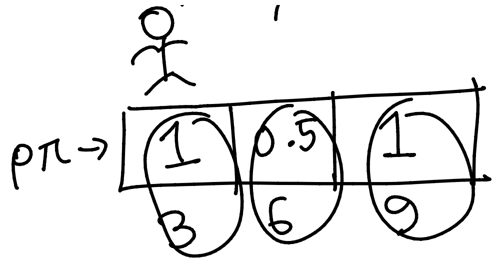
T3:



$$\frac{18+12}{2} = 15$$



$$E(x) = x\cdot\boxed{P(x)}$$



$$E(x) = x \cdot \boxed{p(x)}$$

$$3 + 3 + 9 = 15$$

$$1/6 \times 1/6 = 1/36$$