

2) A fair coin is tossed a fixed number of times. If the probability of getting 7 heads is equal to probability of getting 9 heads, then the probability of getting 2 heads is:

- (1) $\frac{15}{2^{12}}$ (2) $\frac{15}{2^{13}}$ (3) $\frac{15}{2^{14}}$ (4) $\frac{15}{2^8}$

Ans: $P(X=9) = P(X=7)$

$$\Rightarrow {}^n C_9 \left(\frac{1}{2}\right)^{n-9} \times \left(\frac{1}{2}\right)^9 = {}^n C_7 \left(\frac{1}{2}\right)^{n-7} \times \left(\frac{1}{2}\right)^7$$

$$\Rightarrow {}^n C_9 \left(\frac{1}{2}\right)^2 = \left(\frac{1}{2}\right)^2 \times {}^n C_7$$

~~$$\Rightarrow x + y = n \Rightarrow n = 16$$~~

$$\therefore P(X=2) = {}^{16} C_2 \left(\frac{1}{2}\right)^{14} \left(\frac{1}{2}\right)^2$$

$$= {}^{16} C_2 \left(\frac{1}{2}\right)^{16}$$

$$= \frac{15}{2^{13}}$$