1) Let in a Binomial distribution, consisting of 5 independent trials, probabilities of exactly 1 and 2 successes be 0.4096 and 0.2048 respectively. Then the probability of getting exactly 3 successes is equal to:

① $\dfrac{32}{625}$ ② $\dfrac{80}{243}$ ③ $\dfrac{40}{243}$ ④ $\dfrac{128}{625}$

Ans: $P(x=1) = {}^{5}C_{1} \cdot p \cdot q^{4} = 0.4096$

$P(x=2) = {}^{5}C_{2} \cdot p^{2} \cdot q^{3} = 0.2048$

$\Rightarrow \dfrac{q}{2p} = 2$

$\Rightarrow q = 4p \quad, \quad p+q = 1$

$\Rightarrow p = \dfrac{1}{5} \quad, \quad q = \dfrac{4}{5}$

$P(x=3) = {}^{5}C_{3} \cdot \left(\dfrac{1}{5}\right)^{3} \cdot \left(\dfrac{4}{5}\right)^{2} = \dfrac{10 \times 16}{125 \times 25}$

$= \dfrac{32}{625}$