

$$3. \quad n=10 \quad p=0.3$$

$$P(X=4)$$

$$= \frac{n!}{(n-x)! x!} p^x (1-p)^{n-x}$$

$$= \frac{10!}{(10-4)! 4!} (0.3)^4 (1-0.3)^{10-4}$$

$$= \frac{10!}{6! 4!} (0.3)^4 (0.7)^6$$

$$= \frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot \cancel{6} \cdot \cancel{5} \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1}}{\cancel{6} \cdot \cancel{5} \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1} \cdot 4 \cdot 3 \cdot 2 \cdot 1} (0.3)^4 (0.7)^6$$

$$= \frac{\overset{5}{10} \overset{3}{9} \overset{2}{8} 7}{\underset{1}{4} \underset{1}{3} \underset{1}{2} \cdot 1} (0.3)^4 (0.7)^6$$

$$= 210 (0.3)^4 (0.7)^6$$

$$= \boxed{0.2001}$$

$$4. \quad n=10, \quad p=0.2$$

$$P(X < 3)$$

$$P(X) = \frac{n!}{(n-x)! x!} p^x (1-p)^{n-x}$$

$$= P(X=0) + P(X=1) + P(X=2)$$

$$= \frac{10!}{(10-0)! 0!} (0.2)^0 (1-0.2)^{10-0} + \frac{10!}{(10-1)! 1!} (0.2)^1 (1-0.2)^{10-1} + \frac{10!}{(10-2)! 2!} (0.2)^2 (1-0.2)^{10-2}$$

$$= \frac{1}{1} (1)(.8)^{10} + \frac{10}{1} (0.2)(.8)^9 + \frac{9 \cdot 10}{2} (0.2)^2 (.8)^8$$

$$= (.8)^{10} + 2(.8)^9 + 45(0.2)^2 (.8)^8$$

$$= \boxed{0.6778}$$