Chapter: 5

Binomial Probability Distribution (1)

* **Binomial Probability Distribution**

$$f(x) = \binom{n}{x} p^x (1-p)^{n-x}$$

(2) Given success: 23% $\therefore p = 0.23$, $(1-p) = 0.77$

$x = 2$, $n = 6$.

(a) $f(x) = \binom{n}{x} p^x (1-p)^{n-x}$

$$f(2) = \binom{6}{2} p^2 (1-p)^4 = \binom{6}{2} (0.23)^2 (0.77)^4$$

$$= (15)(0.0529)(0.3515)$$

$$\boxed{f(2) = 0.2789}$$

(b) $P(X \geq 2) = f(2) + f(3) + f(4) + f(5) + f(6)$

$f(2) = 0.2789$
$f(3) = 0.1111$
$f(4) = 0.0249$
$f(5) = 0.0030$
$f(6) = 0.0001$

$= 0.4180$

(c) $n=10 \quad x=0$

$$f(0) = \binom{10}{0} (0.23)^0 (0.77)^{10}$$

$$f(0) = 0.0733$$

(29) Given $p = 30\% = 0.30 \quad (1-p) = 0.70$

(a) $n=10 \quad x=3.$

$$f(3) = \binom{10}{3} (0.30)^3 (0.70)^7$$

$$f(3) = 0.2668$$

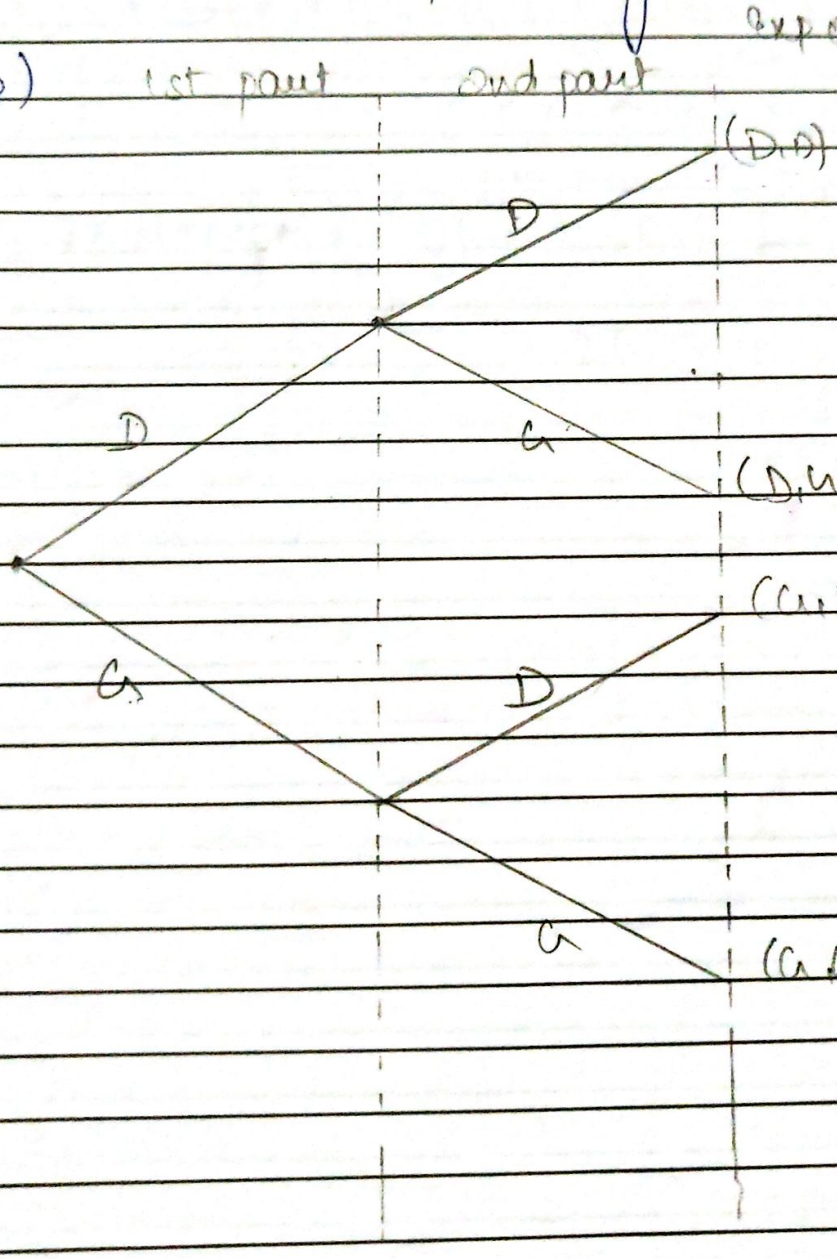
(b) $P(X \geq 3) = f(3) + f(4) + f(5) + \dots + f(10).$

$f(3) = 0.2668$
$f(4) = 0.2001$
$f(5) = 0.1029$
$f(6) = 0.0368$
$f(7) = 0.0090$
$f(8) = 0.0014$
$f(9) = 0.0001$
$f(10) = 0.0000$

$= 0.6171$

(30) (a) Probability of a defective part being produced must be 0.03 for each part selected; parts must be selected independently.

(b)



(c) Two outcomes with exactly one defective found.

(d) $P(\text{no defects}) = \binom{2}{0}(0.03)^0(0.97)^2$

$= 0.97 \times 0.97 = 0.9409$

$P(1 \text{ defect}) = \binom{2}{1}(0.03)^1(0.97)^1$

$= 2 \times 0.03 \times 0.97 = 0.0582$

$P(2 \text{ defects}) = \binom{2}{2}(0.03)^2(0.97)^0$

$= 0.0009$