Ex!- A R v x has following probability distribution:

x	0	1	2	3	4	5	6	7
$p(x)$	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2 + k$

find ① k

② $p(x < 6)$, $p(x \geqslant 6)$, $p(0 < x < 5)$

③ Distribution function

④ $w/ (p \leq c) > \frac{1}{2}$ find min value of c

⑤ find $p\left(\dfrac{1.5 < x < 4.5}{x > 2} \right)$

Sol

① i] $p(x)$ is P.m.f

$\sum p(x) = 1$

$10k^2 + 9k = 1$

$10k^2 + 9k - 1 = 0$

$10k^2 + 10k - k - 1 = 0$

$(k+1)(10k - 1) = 0$

$k = -1 , \quad k = 1/10$

x	0	1	2	3	4	5	6	7
$p(x)$	0	0.1	0.2	0.2	0.3	0.07	0.2	0.12

② $P(x < 6) = 1 - p(x \geqslant 6)$

$= 1 - (p(6) + (p(7)))$

$= 1 - 0.19 = 0.8$

$P(x \geqslant 6) = p(6) + p(7) = 0.02 + 0.17 = 0.19$

$P(0 < x < 5) = p(1) + p(2) + p(3) + p(4) + p(5)$

$= 0.1 + 0.2 + 0.2 + 0.3 = 0.8$

③

$$F(x) = \begin{cases} 0 & x \leq 0 \\ 0.1 & x \leq 1 \\ 0.3 & x \leq 2 \\ 0.8 & x \leq 3 \\ 0.8 & x \leq 4 \\ 0.87 & x \leq 5 \\ 0.83 & x \leq 6 \end{cases}$$

(V)

$p(x \leq 0) = 0$

$p(x \leq 1) = 0.1$

$p(x \leq 2) = 0.3$

$p(x \leq 3) = 0.5$

$p(x \leq 4) = .8 \to \frac{1}{2}$

$\boxed{c = 4}$

(V) $p(A|B) = \dfrac{P(A \cap B)}{P(B)} = \dfrac{p(1.5 < x < 4.1) \cap p(x > 2)}{p(x > 2)}$

$= \dfrac{p(2, 3, 4) \cap p(3, 4, 5, 6, 7)}{1 - \left(p(0) + p(1) + p(4) \right)}$

$= \dfrac{p(3) + p(4)}{1 - (0 + 0.1 + 0.2)}$

$= \dfrac{0.2 + 0.3}{1 - 0.5} = \dfrac{.5}{.7} = \frac{5}{7}$
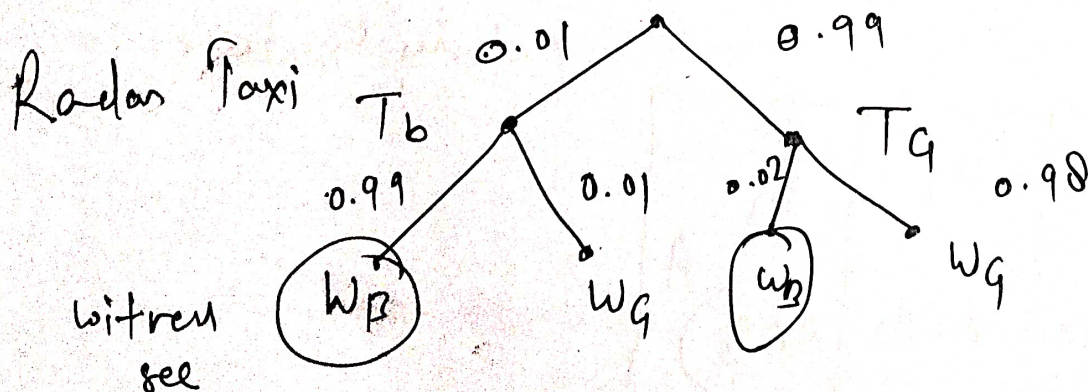
Sol^n:-

P(the witness see blue | the Car is blue)

P(the Car is blue | the witness see blue)

Let W_b = " witness see a blue taxi

W_g = " the witness see a green car'

T_b = " Taxi is blue'

T_g = " Taxi is green'

$$P(T_b | W_b) = \frac{P(W_b | T_b) \cdot P(T_b)}{T(W_b)}$$

Radar Taxi

$$P(T_b) = 0.01 \qquad P(T_g) = 0.99$$

$$P(W_b|T_b) = 0.99 \qquad P(W_b|T_g) = 0.02$$

$$P(W_b) = P(W_b|T_b) \cdot P(T_b) + P(W_b|T_b) P(T_g)$$

$$= 0.99 \times 0.01 + 0.02 \times 0.99$$

$$= .99 \times 0.03$$

$$P(T_b|W_b) = \frac{0.99 \times 0.01}{0.99 \times 0.03} = \frac{1}{3}$$