

Chapter 1.

(1)

a) x	x_1	x_2	x_3	x_4	x_5
$p(x)$	0.16	0.17	0.11	0.22	0.34

y	y_1	y_2	y_3
$p(y)$	0.26	0.47	0.27

b) $x y = y_1$	x_1	x_2	x_3	x_4	x_5
$p(x y = y_1)$	$0.038 \frac{0.01}{0.26}$	0.077	0.115	0.387	0.384

$x y = y_3$	x_1	x_2	x_3	x_4	x_5
$p(x y = y_3)$	$0.370 \frac{0.1}{0.27}$	0.185	0.111	0.185	0.149

(3)

$$P(X) = 0.207$$

$$P(Y) = 0.5$$

$$P(X|Y) = 0.365$$

$$\begin{aligned} a) P(X, Y) &= P(X|Y) \cdot P(Y) \\ &= 0.365 \times 0.5 \\ &= 0.1825 \end{aligned}$$

$$\begin{aligned} b) P(Y|\bar{X}) &= \frac{P(\bar{X}|Y) \cdot P(Y)}{P(\bar{X})} \\ &= \frac{(1 - 0.365) \times 0.5}{1 - 0.207} \\ &= 0.4004 \end{aligned}$$

(4)

$$\text{Var}(x) = E(x - E(x))^2$$

$$= E(x^2 - 2xE(x) + E(x)^2)$$

$$E(ax) = aE(x)$$

$$= E(x^2) + E(-2xE(x)) + E(E(x)^2)$$

$$= E(x^2) - 2E(x)E(x) + E(x)^2 \cdot E(1)$$

$$= E(x^2) - 2E(x)^2 + E(x)^2$$

$$= E(x^2) - E(x)^2$$

HẢI TIẾN

⑤

$P(A)$: xs xe nằm ở ô 1, $P(A) = 1/3$

$P(B)$: xs Monty mở 1 trong 2 cửa còn lại, $P(B) = 1/2$

$P(B|A) = 1/2$

Xs xe nằm ở ô 1 khi Monty mở 1 trong 2 ô còn lại: $P(A|B) = \frac{P(B|A) P(A)}{P(B)}$

$$= \frac{1/3 \times 1/2}{1/2} = \frac{1}{3}$$

Xs xe ko nằm ở ô 1 khi Monty mở 1 trong 2 ô còn lại: $P(\bar{A}|B) = 1 - P(A|B)$

$$= 1 - 1/3 = 2/3$$

→ thay đổi ô sẽ tăng xs trúng xe

②

$$E_y(E_x[X|y]) = \sum E_x[X|y] p(y)$$

$$= \sum p(y) (\sum x p(x|y))$$

$$= \sum \sum p(y) p(x|y) x$$

$$= \sum \sum x p(x, y)$$

$$= \sum x \sum p(x, y)$$

$$= \sum x p(x)$$

$$= E_x[X]$$