Ex 9.2.

$$P(x=1 \mid y=0) = \frac{P(y=0 \mid x=1) \, P(x=1)}{0.85 \times 0.9 + 0.15 \times 0.1}$$

$$= 0.019$$

Ex 9.4

$$P(x=1 \mid y=0) = \frac{0.15 \times 0.1}{0.15 \times 0.1 + 1 \times 0.9}$$

$$= \frac{0.015}{0.015 + 0.9} = \frac{0.015}{0.915}$$

Ex 9.7 marginal distribution

$$P(y=0) = P(y=1) = 0.5.$$

$$H(Y) = H(0.5)$$
$$H(Y|X) = H(0.15)$$
$$I(X;Y) = 1 - 0.61 = 0.39 \text{ bits}$$

Ex 9.8

marginal distribution. $P(y=0) = 0.5 + 0.075 = 0.575$

$$P(y=1) = 0.5 \times 0.85 = 0.425.$$

$$H(Y) = H_2(0.425)$$

$$H(Y|X=0) = 0$$
$$H(Y|X=1) = H_2(0.15)$$
$$H(Y|X) = 0.5 \, H_2(0.15)$$
$$I(X;Y) = H_2(0.425) - \tfrac{1}{2} H_2(0.15) = 0.679 \text{ bits}.$$

Ex 9.12

$$I(X;Y) = H_2\big((1-f)p_1 + (1-p_1)f\big) - H_2(f)$$

若 $(1-f)p_1 + (1-p_1)f = 0.5.$

$$p_1 + f - 2p_1 f = 0.5 \implies p_1 = \frac{0.5 - f}{1 - 2f} = \frac{1}{2}$$

Ex9.13 $H(Y) = H((1-p_1)(1-f), f, p_1 f)$

$0 \to 0$ $H(Y|X) = H_2(0.15)$

$1 \to 1$ $\underline{I(X;Y) = H((1-p_1)(1-f), f, p_1 f) - H_2(f)}$

用 $H(X)$ 算. (只有两次)

$H(X) - H(X|Y) = H(X) - (f(H(X|y=?)))$

$= 1 - f$

Ex9.14.

	00	01	10	11
0 0	0.7225	0	0	0
? 0	0.1275	0	0.1275	0
1 0	0	0	0.7225	0
0 ?	0.1275	0.1275	0	0
? ?	0.0225	0.0225	0.0225	0.0225
1 ?	0	0	0.1275	0.1275
0 1	0	0.7225	0	0
? 1	0	0.1275	0	0.1275
1 1	0	0	0	0.7225

选两列重合最少的.

10 和 11