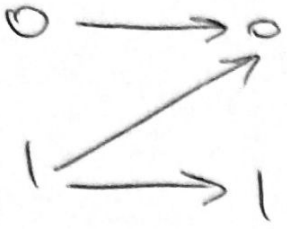
2 N10.1



i) $\boxed{P(y=0) = 0.8 \cdot 1 + 0.2 \cdot 0.1 = 0.82}$

4 $\boxed{P(y=1) = 0.2 \cdot 0.9 = 0.18}$

ii) $P(x=1 \mid y=0) = \frac{P(1,0)}{P(y=0)} = \frac{0.02}{0.82} \approx 0.024$

iii) $I(x,y) = S(x) - S(x|y)$

$S(x|y) = \sum P(y_i)\, S(x \mid y = y_i)$

$S(x \mid y=y_i) = -\sum_j P(x_j \mid y_i) \log_2 (x_j \mid y_i)$

$P(x|y) = \frac{P(x,y)}{P(y)}$

$S(x) = -\sum_i P(x_i) \log_2 P(x_i)$

$S(x) = -0.2 \log_2 0.2 - 0.8 \log_2 0.8 \approx 0.72$

$S(x \mid y=0) = \frac{0.8}{0.82} \log \frac{0.8}{0.82} - \frac{0.02}{0.82} \log \frac{0.02}{0.82} \approx 0.167$

$$S(x|y) = 0$$

$$S(x|y) = 0.82 \cdot 0.1654 = 0.1356$$

$$I = S(x) - S(x|y) = 0.7218 - 0.1356 \approx$$

$$\boxed{\approx 0.5862}$$