X_1 0 0 1 1 0 0 1 1 1 0

0 1 0 1 1 1 1 1 1 1

0 0 0 0 0 1 1 1 1 1

$P(Y=0) = \frac{1}{2}$ $P(Y=1) = \frac{1}{2}$

$P(X_1=0 \mid Y=0) = \frac{3}{5}$

$P(X_2=0 \mid Y=0) = \frac{2}{5}$

$P(X_1=1 \mid Y=0) = \frac{3}{5}$

$P(X_1=0 \mid Y=1) = \frac{2}{5}$

$P(X_2=0 \mid Y=1) = 0$

$P(X_1=1 \mid Y=1) = \frac{3}{5}$

$P(X_2=1 \mid Y=1) = 1$

$$P(Y=y \mid X=x) = \frac{P(Y=y) \cdot P(X=x \mid Y=y)}{\sum_{k=1}^{K} P(Y=k) P(X=x \mid Y=k)}$$

$$P(Y_0=0 \mid X_1=1, X_2) = \frac{\frac{2}{5} \cdot \frac{3}{5} \cdot \frac{1}{2}}{\frac{2}{5} \cdot \frac{3}{5} \cdot \frac{1}{2} + \frac{5}{5} \cdot \frac{1}{2}} = \frac{2}{7}$$

$$P(Y=1 \mid X_1=1, X_2=1) = \frac{\frac{3}{5} \cdot 1 \cdot \frac{1}{2}}{\frac{2}{5} \cdot \frac{3}{5} \cdot \frac{1}{2} + \frac{5}{5} \cdot 1 \cdot \frac{1}{2}} = \frac{5}{7}$$