

Homework 1

Qianlang Chen

Problem 1

Part (a)

$$\begin{aligned}P(Y \neq 1) &= P(Y = 0) \\&= P(Y = 0 \cap X = 0) + P(Y = 0 \cap X = 1) \\&= 0.4 + 0.1 \\&= \boxed{0.5}\end{aligned}$$

Part (b)

$$P(X = 1 \cap Y = 0) = \boxed{0.1}$$

Part (c)

$$\begin{aligned}P(X = 1|Y = 0) &= P(X = 1 \cap Y = 0) \div P(Y = 0) \\&= 0.1 \div 0.5 \\&= \boxed{0.2}\end{aligned}$$

Part (d)

Yes since the probability of X being some value does not depend on the value of Y, which is the definition of independence. For example,

$$P(X = 1) = 0.1 + 0.1 = 0.2 = P(X = 1|Y = 0)$$

Problem 2

Part (a)

Part (b)

Part (c)

Part (d)

Part (e)

Part (f)

Problem 3

Part (a)

Part (b)

Problem 4