CSDS 440: Assignment 1

Shaochen (Henry) ZHONG, sxz517

Mingyang Tie, mxt497

Due on and submitted on 09/11/2020

Problem 1

For a dice roll, let $A = \{1, 2\}$, $B = \{2, 3, 4\}$, and $C = \{1, 3\}$. We have $P(A) = \frac{1}{3}$, $P(B) = \frac{1}{2}$, and $P(C) = \frac{1}{3}$.

Now we have:

$$P(A, B) = \{2\} = \frac{1}{6} = P(A)P(B) \text{ Thus } A \text{ is independent of } B.$$
$$P(A \mid C) = \frac{\{1\}}{\frac{1}{3}} = \frac{1}{2}$$
$$P(B \mid C) = \frac{\{3\}}{\frac{1}{3}} = \frac{1}{2}$$
$$P(A, B \mid C) = \emptyset = 0 \neq P(A \mid C) \cdot P(B \mid C)$$

And this proven the statement.