STAT 5700 — Quiz 2
Date: February 5, 2026
SOLUTIONS

Problem 1

Let A and B be two events such that $P(A) = 0.4$, $P(B) = 0.3$, and $P(A \cap B) = 0.2$.

a. Are A and B independent?

$$P(A)P(B) = (0.4)(0.3) = 0.12 \neq P(A \cap B) = 0.2$$

Therefore, A and B are not independent.

b. Find $P(A \mid A \cup B)$

$$P(A \mid A \cup B) = \frac{P(A \cap (A \cup B))}{P(A \cup B)}$$

$$P(A \cap (A \cup B)) = P(A) = 0.4$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.4 + 0.3 - 0.2 = 0.5$$

$$P(A \mid A \cup B) = \frac{0.4}{0.5}$$

Problem 2

An email system uses a spam filter.

- $P(\text{Spam}) = 0.30$
- $P(\text{Flagged} \mid \text{Spam}) = 0.95$
- $P(\text{Flagged} \mid \text{Not Spam}) = 0.03$

Find $P(\text{Spam} \mid \text{Flagged})$.

$$P(\text{Spam} \mid \text{Flagged}) = \frac{P(\text{Flagged} \mid \text{Spam})P(\text{Spam})}{P(\text{Flagged} \mid \text{Spam})P(\text{Spam}) + P(\text{Flagged} \mid \text{Not Spam})P(\text{Not Spam})}$$

$$= \frac{(0.95)(0.30)}{(0.95)(0.30) + (0.03)(0.70)}$$