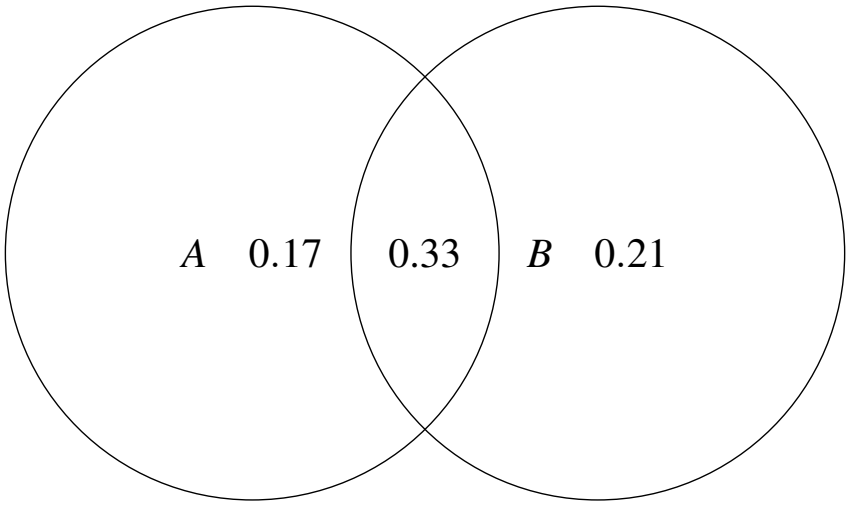
Kaleb Burris
STAT F300 Statistics, Dr. Short
Worksheet 6, due Friday 3 February, 4:15pm

1.

Let A and B be events which satisfy: $P(B \cap A^C) = 0.21, P(A \cup B) = 0.71$, and $P(B^C) = 0.46$.

(a) Sketch and label an appropriate Venn diagram, along with associated probabilities. (Your diagram should have 4 non-negative numbers that sum to 1.)

$$P(A^C \cup B^C) = 1 - P(A \cup B) = 1 - 0.71 = 0.29$$



$$P(B) = 1 - P(B^C) = 1 - 0.46 = 0.54$$
$$P(A) = P(A \cup B) - P(B^C) = 0.71 - 0.54 = 0.17$$
$$P(A \cap B) = P(A \cup B) - (P(A) + P(B)) = 0.71 - 0.38 = 0.33$$
$$P(B \cap A^C) = P(B) - P(A \cap B) = 0.54 - 0.33 = 0.21$$

(b) Find $P(A|B)$

$$P(A|B) = P(A \cap B) = \boxed{0.33}$$

(c) Find $P(B|A)$

$$P(A|B) = P(B \cap A) = \boxed{0.33}$$

(d) Find $P(B|A^C)$

$$P(B|A^C) = P(B \cap A^C) = \boxed{0.21}$$

2. Consider an experiment in which we roll two fair 6-sided dice, one Red, one White.

Let

$$A = \{\text{Red is at most 2}\}$$
$$B = \{\text{The sum is exactly 7}\}$$
$$C = \{\text{The difference is either +1 or -1}\}$$

(a) Find $P(A|C)$.

$$P(\text{Red} \leq 2 | \text{Red - White} = +/-1) =$$

(b) Find $P(C|A)$.

(c) Find $P(B|A)$.

(d) Find $P(C|B)$.