

Due by 4pm on Friday, September 13. Please leave your homework on the table before class begins on Friday or leave it in the dropbox outside my office. Do not forget to attach the honor code. Each problem is worth 10 points.

- (1) Express the following probabilities in terms of $P(A)$, $P(B)$, and $P(A \cap B)$.
 - (a) $P(A^c \cup B^c)$
 - (b) $P(A^c \cap (A \cup B))$
- (2) Let A and B be two events defined on S . If the probability that at least one of them occurs is 0.3 and the probability that A occurs but B does not occur is 0.1, what is $P(B)$?
- (3) Suppose that three fair dice are tossed. Let A_i be the event that a 6 shows on the i th die, $i = 1, 2, 3$. Does $P(A_1 \cup A_2 \cup A_3) = \frac{1}{2}$?
- (4) In the game of “odd man out” each player tosses a fair coin. If all the coins turn up the same except for one, the player tossing the different coin is declared the odd man out and is eliminated from the contest. Suppose that three people are playing. What is the probability that someone will be eliminated on the first toss?
- (5) If State’s football team has a 10% chance of winning Saturday’s game, a 30% chance of winning two weeks from now, and a 65% chance of losing both games, what are their chances of winning exactly once?
- (6) Three events - A , B , and C - are defined on a sample space, S . Given that $P(A) = 0.2$, $P(B) = 0.1$, and $P(C) = 0.3$, what is the smallest possible value for $P((A \cup B \cup C)^c)$?
- (7) A coin is to be tossed four times. Define events X and Y such that

X : first and last coins have opposite faces

Y : exactly two heads appear

Assume that each of the sixteen head/tail sequences has the same probability. Evaluate

- (a) $P(X^c \cap Y)$
 - (b) $P(X \cap Y^c)$
- (8) Let A , B , and C be three events defined on a sample space, S . Arrange the probabilities of the following events from smallest to largest:
 - (a) $A \cup B$
 - (b) $A \cap B$
 - (c) A
 - (d) S
 - (e) $(A \cap B) \cup (A \cap C)$
 - (9) Consolidated Industries has come under considerable pressure to eliminate its seemingly discriminatory hiring practices. Company officials have agreed that during the next five years, 60% of their new employees will be females and 30% will be minorities. One out of four new employees, though, will be a white male. What percentage of their new hires will be minority females?
 - (10) Events A_1 and A_2 are such that $A_1 \cup A_2 = S$ and $A_1 \cap A_2 = \emptyset$. Find p_2 if $P(A_1) = p_1$, $P(A_2) = p_2$, and $3p_1 - p_2 = \frac{1}{2}$.