Exercises 2.1

*2.1-1 To test the quality of a shipment of crystal glasses, we selected 50 glasses at random. We found that one was scratched and chipped, three had only scratches, and two were only chipped. Consider the following events: A is the occurrence of a chipped glass and B is the occurrence of a scratched glass. Determine the relative frequencies of A, B, $A \cup B$, and $A \cap B$.

2.1-2 To 125 students that took last semester's engineering statistics course, the instructor gave 30 A's, 40 B's, 35 C's, 15 D's, and 5 F's. Calculate the relative frequencies of these five events. Calculate the relative frequency of getting a grade that is better than C.

*2.1-3 Consider rolling a single die (one of a pair of dice). Assume that each up side is equally likely. What is the probability that the experiment ends in rolling a "4"? What is the probability that it ends in an even number?

2.1-4 A person has purchased 5 of 1,000 tickets sold in a certain raffle. To determine the 10 prizewinners, 10 tickets are drawn at random and without replacement.
(a) Compute the probability that this person wins exactly one prize.
(b) Compute the probability that he wins at least one prize.
    Hint: First compute the probability that he does not win a prize.

2.1-5 A bowl contains 20 chips, of which 9 are red, 8 are white, and 3 are blue. Six chips are taken at random and without replacement. Find the probability that
(a) each of the 6 chips is red;
(b) there are 3 red, 2 white, and 1 blue chip among the six chips selected;
(c) none of the 6 chips selected is blue; and
(d) there is at least 1 white and at least 1 blue chip among the 6 selected.
    Hint: Consider the complement of at least 1 white and at least 1 blue chip.

*2.1-6 A lot of 100 fuses is accepted if at least 9 of 10 fuses taken at random "blow" at the correct amperage. If there are exactly 20 defectives among the 100 fuses, what is the probability of accepting the lot? If there are exactly 10 defectives among the 100 fuses, what is the probability of accepting the lot?

2.1-7 Compute the probability of being dealt, at random and without replacement, a 13-card bridge hand consisting of
(a) 4 spades, 4 hearts, 3 diamonds, and 2 clubs;
(b) 13 cards of the same suit.

2.1-8 If $S = A \cup B$, $P(A) = 0.7$, and $P(B) = 0.8$, find $P(A \cap B)$.

2.1-9 If $P(A) = 0.4$, $P(B) = 0.5$, and $P(A \cup B) = 0.7$, find
(a) $P(A \cap B)$;
(b) $P(A' \cup B')$.

*2.1-10 If $P(A) = 0.4$, $P(B) = 0.5$, and $P(A \cap B) = 0.3$, find
*(a) $P(A \cup B)$;
*(b) $P(A' \cap B)$;
*(c) $P(A' \cup B')$.