Name:_____   R. Hammack   Score:_____

Directions You must show your work to get full credit. This test is closed-book and closed-notes. No calculators or other electronic devices are allowed. Simplify your answers if it is easy to do so, but you may leave complex answers unsimplified. All you will need is something to write with.

1. (10 points) Toss a coin and then roll a 6-sided dice. Write out the sample space S for this experiment. Consider the event E : *The coin is heads or the dice is* ⚃ *(four)*.
   Circle E in S. Find $p(E)$.

2. (10 points) Toss a dice 10 times in a row.
   What are the chances that exactly five of the tosses are ⚃ (four)?

3. (10 points) The top card and the bottom card of a shuffled 52-card deck are removed.
   You win a dollar if the top card a diamond or the bottom card is a heart.
   What are your chances of winning?

4. (10 points) A 5-card hand is dealt off a shuffled standard 52-card deck.
   What is the probability that not all of the cards are red?

5. (10 points) A box contains 8 red balls and 5 green balls. You reach in and remove two balls, one after the other. What is the probability that the two balls have the same color?

6. (10 points) Suppose $A, B \subseteq S$ are two events in the sample space S of some experiment. Suppose $p(A) = 40\%$, $p(A|B) = 40\%$ and $p(B|A) = 50\%$.

   (a) $p\left(\overline{A}\right) =$

   (b) Are A and B independent or dependent?

   (c) $p(A \cap B) =$

   (d) $p(B) =$

   (e) $p(A \cup B) =$

7. (10 points) A coin is tossed three times in a row, and there are more heads than tails. What is the probability that the first toss is a tail?

8. (10 points) Give the output for the following chunk of pseudocode.

$y := 5$
for $n := 1$ **to** 5 **do**
  $y := 10 \cdot y$
  output y
end
output y

9. (10 points) What does the following algorithm do?

Algorithm

Input: A list $X = (x_1, x_2, \ldots, x_n)$ of integers
Output: ?
begin
    sum := 0
    for $k := 1$ **to** n **do**
        if $(x_k = 0)$ **then**
        | sum := sum+1
        end
    end
    output sum
end

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10. (10 points) Write an algorithm whose input is a positive integer n and whose output is the first n terms of the sequence $6, 16, 26, 36, 46, 56, \ldots$.