

Name: _____

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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) You have two fair 6-sided dice, a black one and a white one. You toss them both. Write out the sample space S , and circle the event $E \subseteq S$ of the two dice adding to 5. Find $p(E)$.

2. (10 points) Toss a coin 12 times in a row. What are the chances that exactly four of the tosses are tails?

3. (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 hearts?

4. (10 points) A 4-card hand is dealt off a shuffled standard 52-card deck.
What is the probability that all four cards are black or none of them are clubs?

5. (10 points) A box contains 5 red balls, 4 green balls and 1 blue ball. You reach in and remove two balls, one after the other. What is the probability that one of the balls is blue?

6. (10 points) Suppose $A, B \subseteq S$ are two events in the sample space S of some experiment. Suppose $p(A) = 25\%$, $p(A|B) = 50\%$ and $p(B|A) = 40\%$.

(a) $p(\bar{A}) =$

(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 woman has four children (no twins). Consider the following events:

A: She has two girls and two boys.

B: Her oldest child is a boy.

Are events *A* and *B* independent, dependent, or is there not enough information to say for sure?

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

```
y := 2
for n := 1 to 5 do
  | y := 10 - y
  | output y
end
output y
```

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

Algorithm

Input: A natural number $n \in \mathbb{N}$

Output: ?

begin

while ($n > 1$) **do**
 | $n := n - 2$

end

if ($n = 1$) **then**
 | **output** "Yes"

else

 | **output** "No"

end

end

10. (10 points) Write an algorithm whose input is a positive integer n and whose output is the first n terms of the sequence 3, 6, 12, 24, 48, 96, ...