

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 indicate the event $E \subseteq S$ of both dice showing the same number (rolling doubles). Find $p(E)$.

2. (10 points) Toss a fair 6-sided dice 10 times in a row.
What are the chances of getting exactly two fives (🎲) among the 10 rolls?

3. (10 points) A 7-card hand is dealt off a shuffled standard 52-card deck.
What is the probability that the hand consists entirely of red cards, or has no hearts?

4. (10 points) A 7-card hand is dealt off a shuffled standard 52-card deck.
What is the probability that not all of the cards are black?

5. (10 points) A box contains 8 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 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 $p(A) = 60\%$, $p(B) = 80\%$ and $p(A|B) = 50\%$.
- (a) $p(A \cap B) =$
- (b) $p(A \cup B) =$
- (c) $p(B|A) =$
- (d) $p(\overline{B}) =$
- (e) Are A and B independent or dependent?

7. (10 points) A man has three children, and there are more girls than boys. What is the probability that his oldest child is a boy?

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

```
 $y := 3$   
for  $n := 1$  to 4 do  
  | output  $y$   
  |  $y := 10 \cdot y$   
end
```

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 ($n = 0$) **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 6, 11, 16, 21, 26, 31, 36, 41 . . .