1.(1 pt)

The sample space for an experiment contains five sample points. The probabilities of the sample points are:

$P(1) = P(2) = 0.1$

$P(3) = P(4) = 0.05$

$P(5) = 0.7$

Find the probability of each of the following events:

A : { Either 3 or 5 occurs }

B : { Either 3, 2, or 4 occurs }

C : {1 does not occur }

$P(A) =$_____ $P(B) =$_____ $P(C) =$_____

2.(1 pt)

Two fair dice are tossed, and the up face on each die is recorded. Find the probability of observing each of the following events:

A : { The sum of the numbers is equal to 4 }

B : { The sum of the numbers is odd }

C : { A 6 appears on exactly one of the dice }

$P(A) =$ _____ $P(B) =$ _____ $P(C) =$ _____

3.(1 pt)

Consider the experiment composed of one roll of a fair die followed by one toss of a fair coin. Determine the probability of each of the following events.

A : { An H appears on the coin. }

B : { An even number appears on the die; a T appears on the coin. }

C : { An even number appears on the die. }

$P(A) =$_____ $P(B) =$_____ $P(C) =$_____

4.(1 pt) In the game Roulette, a ball spins on a circular wheel that is divided into 38 arcs of equal lenght, numbered 00, 0, 1, 2, ... , 35, 36. The number on the arc on which the ball stops is the outcome of one play of the game. The numbers are also colored as follows:

1, 3, 5, 7, 9, 12, 14, 16, 18, 19, 21, 23, 25, 27, 30, 32, 34, 36 are red,

2, 4, 6, 8, 10, 11, 13, 15, 17, 20, 22, 24, 26, 28, 29, 31, 33, 35 are black,

0, 00 are green

Define the following events:

A : { Outcome is an even number (0 and 00 are considered neither odd nor even) }

B : { Outcome is a red number }

C : { Outcome is a green number }

D : { Outcome is a low number (1-18) }

Find the following probablilities:

(a) $P(A) =$ _____

(b) $P(C \cup D) =$ _____

(c) $P(A \cap B \cap C) =$ _____

5.(1 pt)

A couple decided to have 4 children.

(a) What is the probability that they will have at least one boy? _____

(b) What is the probability that all the children will be of the same gender? _____

6.(1 pt)

Consider two people being randomly selected. (For simplicity, ignore leap years.)

(a) What is the probability that two people were born on Sunday?

answer: _____

(b) What is the probability that two people have a birthday on the 6^{th} of any month?

answer: _____

7.(1 pt)

In a study by the Department of Transportation, there were a total of 82 drivers that were pulled over for speeding. Out of those 82 drivers, 40 were men who were ticketed, 11 were men who were not ticketed, 7 were women who were ticketed, and 24 were women who were not ticketed. Suppose one person was chosen at random.

(a) What is the probability that the selected person is a man or someone who was not ticketed?

answer: _____

(b) What is the probability that the selected person is a woman or someone who was ticketed?

answer: _____

8.(1 pt) An elementary school is offering 3 language classes: one in Spanish, one in French, and one in German. These classes are open to any of the 84 students in the school. There are 33 in the Spanish class, 35 in the French class, and 17 in the German class. There are 12 students that in both Spanish and French, 5 are in both Spanish and German, and 8 are in both French and German. In addition, there are 2 students taking all 3 classes.

If one student is chosen randomly, what is the probability that he or she is taking exactly one language class? _____

If two students are chosen randomly, what is the probability that both of them are taking French? _____

9.(1 pt) A group of kids containing 14 boys and 10 girls is lined up in random order - that is, each of the 24! permutations is assumed to be equally likely. What is the probability that the person in the 10-th position is a boy?

_____

10.(1 pt) An instructor gives his class a set of 13 problems with the information that the next quiz will consist of a random selection of 3 of them. If a student has figured out how to do 4 of the problems, what is the probability the he or she will answer correctly

(a) all 3 problems? _____

(b) at least 2 problems? _____

11.(1 pt) How many people have to be in a room in order that the probability that at least two of them celebrate their birthday on the same day is at least 0.09? (Ignore leap years, and assume that all outcomes are equally likely.)

12.(1 pt)

A fair coin is tossed three times and the events A, B, and C are defined as follows:

A : { At least one head is observed }

B : { At least two heads are observed }

C : { The number of heads observed is odd }

Find the following probabilities by summing the probabilities of the appropriate sample points:

(a) $P(C) =$ _____

(b) $P(A \cup B^c) =$ _____

(c) $P(A^c \cup B^c \cup C) =$ _____

13.(1 pt)

A fair coin is tossed three times and the events A, B, and C are defined as follows:

A : { At least one head is observed }

B : { At least two heads are observed }

C : { The number of heads observed is odd }

Find the following probabilities by summing the probabilities of the appropriate sample points:

(a) $P(C) =$ _____

(b) $P(A \cap B) =$ _____

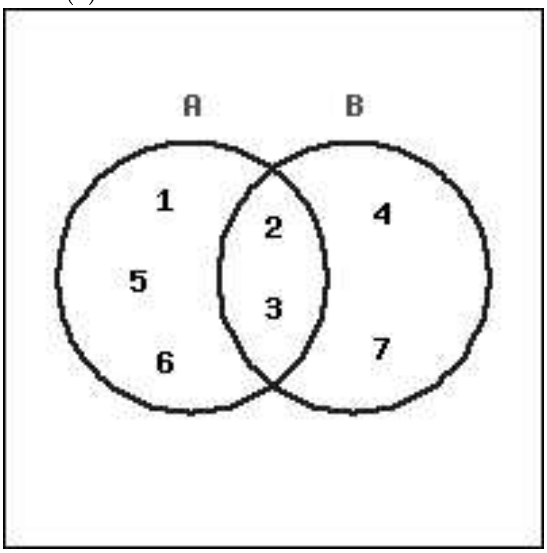
(c) $P(A \cup B \cup C) =$ _____

14.(1 pt) A sample space contains 7 sample points and events A and B as seen in the Venn diagram.

Let $P(1) = P(2) = P(3) = P(7) = 0.05$

$P(4) = P(5) = 0.15$

and $P(6) = 0.5$.



Use the Venn diagram and the probabilities of the sample points to find:

(a) $P(A^c) =$ _____

(b) $P(A) =$ _____

(c) $P(B^c) =$ _____

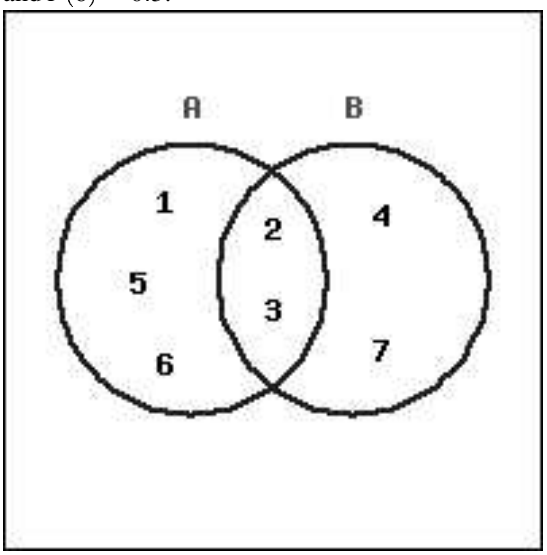
(d) $P(B) =$ _____

15.(1 pt) A sample space contains 7 sample points and events A and B as seen in the Venn diagram.

Let $P(1) = P(2) = P(3) = P(7) = 0.15$

$P(4) = P(5) = 0.05$

and $P(6) = 0.3$.



Use the Venn diagram and the probabilities of the sample points to find:

(a) $P(B) =$ _____

(b) $P(\overline{B}) =$ _____

(c) $P(A \cap B) =$ _____

(d) $P(A \cup \overline{A}) =$ _____

16.(1 pt)

The number 32 is written as a sum of three natural numbers

$$32 = a + b + c$$

(the triple (a,b,c) is ordered; e.g., the decompositions $32 = 1+1+30$ and $32 = 1+30+1$ are different.

Also, assume that all the decompositions have equal probability.)

What is the probability that there exists a triangle with sides a, b, and c? _____

17.(1 pt) A quick quiz consists of 3 multiple choice problems, each of which has 6 answers, only one of which is correct. If you make random guesses on all 3 problems,

(a) What is the probability that all 3 of your answers are incorrect?

answer: _____

(b) What is the probability that all 3 of your answers are correct?

answer: _____

18.(1 pt) Two six-sided dice are rolled (one red one and one green one). Some possibilities are (Red=1,Green=5) or (Red=2,Green=2) etc.

(a) How many total possibilities are there?

For the rest of the questions, we will assume that the dice are fair and that all of the possibilities in (a) are equally likely.
(b) What is the probability that the sum on the two dice comes out to be 8? (Remember the answer will be a ratio, the denominator of which will be your answer in (a).)

(c) What is the probability that the sum on the two dice comes out to be 7?

(d) What is the probability that the numbers on the two dice are equal?

A card is selected at random from a standard 52-card deck.
(a) What is the probability that it is an ace? _____
(b) What is the probability that it is a heart? _____
(c) What is the probability that is an ace or a heart? _____

20.(1 pt) A five-card poker hand is dealt at random from a standard 52-card deck.
Note the total number of possible hands is C(52,5)=2,598,960.
Find the probabilities of the following scenarios:
(a) What is the probability that the hand contains exactly one ace?
Answer=$\frac{\alpha}{C(52,5)}$, where $\alpha =$ _____

(b) What is the probability that the hand is a flush? (That is all the cards are of the same suit: hearts, clubs, spades or diamonds.)
Answer=$\frac{\beta}{C(52,5)}$, where $\beta =$ _____

(c) What is the probability that the hand is a straight flush?
Answer=$\frac{\gamma}{C(52,5)}$, where $\gamma =$ _____

What is the probability that a positive integer m in the range $1 \leq m \leq 100$, which is selected randomly, is divisible by 3?