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Problem 1

A family has 3 children. Assume that each child is as likely to be a boy as it is to be a girl. Find the probability that the family has 3 girls if it is known the family has at least one girl.

Answer: _____
Correct Answers:

- $\frac{1}{7}$

+6pc-1pc
Problem 2

One hundred people were surveyed, and one question pertained to their educational background. The results of this question and their genders are given in the following table.

	Female (F)	*Male (F')*	*Total*
College degree (D)	23	27	50
No college degree (D')	30	20	50
Total	53	47	100

If a person is selected at random from those surveyed, find the probability if each of the following events.

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1. The person is female or has a college degree.
Answer: _____

2. The person is male or does not have a college degree.
Answer: _____

3. The person is female or does not have a college degree.
Answer: _____

Correct Answers:

- $1-\frac{20}{100}$
- $1-\frac{23}{100}$
- $1-\frac{27}{100}$

+6pc-1pc
Problem 3

In a recent election there were 1000 eligible voters. They were asked to vote on two issues, A and B. The results were as follows: 100 people voted for A, 500 people voted for B, and 50 people voted for A and B. If one person is chosen at random from the 1000 eligible voters, find the following probabilities:

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1. The person voted for A, given that he voted for B.
Answer: _____

2. The person voted for B, given that he voted for A.
Answer: _____

Correct Answers:

- $\frac{50}{500}$
- $\frac{50}{100}$

+6pc-1pc
Problem 4

A bag contains 4 red marbles and 5 white marbles. Two marbles are drawn in succession without replacement. Find the probabilities of the following events:

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1. The first marble drawn is red and the second is white.
Answer: _____

2. Both marbles drawn are red.
Answer: _____

Correct Answers:

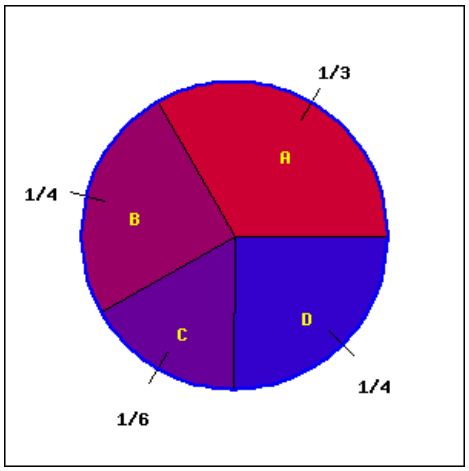
- $\frac{4}{9}\frac{5}{2 \cdot 4}$
- $\frac{4}{9}\frac{4-1}{2 \cdot 4}$

+6pc-1pc
Problem 5

Based on the spinner below answer the following:

(a) In two consecutive spins what, is the probability of a B followed by an A?
Answer: _____

(b) In a single spin, what is the probability of obtaining an A given the spinner did not land on a B?
Answer: _____



Correct Answers:

- 0.0833333333333333
- 0.444444444444444

+6pc-1pc

Problem 6

In a survey of 301 people, the following data were obtained relating gender to political orientation:

	Republican (R)	Democrat (D)	Libertarian (L)	Total
Male (M)	78	72	13	163
Femal (F)	96	27	15	138
Total	174	99	28	301

A person is randomly selected. What is the probability that the person is:
a) Male? _____
b) Male and a Democrat? _____
c) Male given that the person is a Democrat? _____
d) Republican given that the person is Male? _____
e) Female given that the person is a Libertarian? _____
f) Are the events Male and Republican independent? _____ Enter *yes* or *no* .
Correct Answers:

- 0.541528239202658
- 0.239202657807309
- 0.727272727272727
- 0.478527607361963
- 0.535714285714286
- no

+6pc-1pc

Problem 7

Real estate ads suggest that 52 % of homes for sale have garages,
17 % have swimming pools, and
13 % have both features.
What is the probability that a home for sale has
a) a pool or a garage?
Answer = ____ %
b) neither a pool nor a garage?
Answer = ____ %
c) a pool but no garage?
Answer = ____%
Correct Answers:

- 56
- 44
- 4

+6pc-1pc

Problem 8

Consider the experiment, called the **birthday problem** , where
our task is to determine the probability that in a group of people of a
certain size there are at least two people who have the same birthday
(the same month and day of month). Suppose there is a room with 7 people
in it, find the probability that at least two people have the same birthday. Ignore leap years; assume each year has 365 days.
Answer = _____
Correct Answers:

- 0.0562357

+6pc-1pc
Problem 9

Factories A, B and C produce computers. Factory A produces 3 times as many computers as factory C, and factory B produces 6 times as many computers as factory C. The probability that a computer produced by factory A is defective is 0.015, the probability that a computer produced by factory B is defective is 0.034, and the probability that a computer produced by factory C is defective is 0.036.

A computer is selected at random and it is found to be defective. What is the probability it came from factory A?
Answer:_____

Correct Answers:

- 0.157894736842105

+6pc-1pc
Problem 10

An information technology company produces 44% of its computer chips at a plant in St. Louis and the remainder of its chips at a plant in Chicago. It is known that 0.9% of the chips produced in St. Louis are defective, while 1% of the chips produced at the plan in Chicago are defective. What is the probability that a randomly chosen computer chip produced by this company is defective and was produced in St. Louis?

_____
Correct Answers:

- 0.00396

+6pc-1pc
Problem 11

Suppose events A, B, C, and D have probabilities as follows:

	A	B	Totals
C	0.17	0.28	0.45
D	0.22	0.33	0.55
Totals	0.39	0.61	1.00

Find the following:

i) $P(A \cap D) =$ _____

ii) $P(A \cup D) =$ _____

iii) $P(D \mid A) =$ _____

iv) $P(B \mid C) =$ _____

Correct Answers:

- 0.22
- 0.72
- 0.564103
- 0.622222

+6pc-1pc

Problem 12

You ask a neighbor to water a sickly plant while you are on vacation. Without water the plant will die with probability 0.75. With water it will die with probability 0.6. You are 82 % certain the neighbor will remember to water the plant.
You come back from the vacation and the plant is dead. What is the probability that the plant died because neighbor forgot to water it?

Answer: ____

Correct Answers:

- 0.215311004784689

+6pc-1pc

Problem 13

Two balls were placed in a box. Each ball was equally likelt to be red or green.
It is known that at least one of the balls is red.

The probability that both of the balls are red is __

Solution:

Solution

There are three ways that one of the balls can be red.
The two balls can be red.
The first ball can be red and the second ball can be green.
The first ball can be green and the second ball can be red.

Thus of the three equally likely cases only one has both balls red so the probability is $\frac{1}{3}$.

Correct Answers:

- $\frac{1}{2}$

+6pc-1pc

Problem 14

The chartered financial analyst (CFA) is a designation earned after taking three annual exams (CFA I,II, and III). The exams are taken in early June. Candidates who pass an exam are eligible to take the exam for the next level in the following year. The pass rates for levels I, II, and III are 0.58, 0.72, and 0.81, respectively. Suppose that 3,000 candidates take the level I exam, 2,500 take the level II exam and 2,000 take the level III exam. Suppose that one of the 7,500 candidates is selected at random. What is the probability that he or she passes the exam?

Probability = _____

Correct Answers:

- 0.688

+6pc-1pc
Problem 15

Suppose that A and B are two events for which $P(A) = 0.33$, $P(B) = 0.77$, and $P(B|A) = 0.42$ Find each of the following:

A. $P(A \text{ and } B) =$ _____

B. $P(A \text{ or } B) =$ _____

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

Correct Answers:

- 0.1386
- 0.9614
- 0.18

+6pc-1pc
Problem 16

A card is drawn from a regular deck of 52 cards and is then put back in the deck. A second card is drawn. What is the probability that:

(a) The first card is red. _____

(b) The second card is hearts given that the first is red. _____

(c) The first card is red and the second is hearts. _____
Correct Answers:

- 0.5
- 0.25
- 0.125

+6pc-1pc
Problem 17

Events A_1, A_2 and A_3 form a partiton of the sample space S with probabilities $P(A_1) = 0.4$, $P(A_2) = 0.1$, $P(A_3) = 0.5$.
If E is an event in S with $P(E|A_1) = 0.5$, $P(E|A_2) = 0.3$, $P(E|A_3) = 0.7$, compute

$P(E) =$ ____
$P(A_1|E) =$ ____
$P(A_2|E) =$ ____
$P(A_3|E) =$ ____

Correct Answers:

- 0.58
- 0.344827586206897
- 0.0517241379310345
- 0.603448275862069

+6pc-1pc
Problem 18

Two cards are drawn from a regular deck of 52 cards, without replacement. What is the probability that the first card is an ace of clubs and the second is black?
Answer: _____

Correct Answers:

- 0.00942684766214178

+6pc-1pc
Problem 19

What is the probability that a 8-digit phone number contains at least one 6? (Repetition of numbers and lead zero are allowed).

Answer: ____
Solution: It is easiest to think about the probability that the phone number contains no 6s. For each digit, there are 9 ways to not pick a 6; there are 10 ways in total. Thus the total number of ways to avoid picking a 6 in the 8 digit number is 9^8, and the total number of ways to pick any phone number is 10^8. The probability of having no 6s is therefore $(\frac{9}{10})^8$, and the probability of having at least one 6 is $1 - (\frac{9}{10})^8$.

Correct Answers:

- $1 - \left(\frac{9}{10}\right)^8$

+6pc-1pc

Problem 20

A box contains one yellow, two red, and three green balls. Two balls are randomly chosen without replacement. Define the following events:

A : { One of the balls is yellow }

B : { At least one ball is red }

C : { Both balls are green }

D : { Both balls are of the same color }

Find the following conditional probabilities:

(a) $P(B|A^c) =$ ____

(b) $P(D|B) =$ ____

(c) $P(C|A) =$ ____

Correct Answers:

- 0.7
- 0.111111111111111
- 0

+6pc-1pc

Problem 21

What is the probability that at least one of a pair of fair dice lands of 2, given that the sum of the dice is 6?

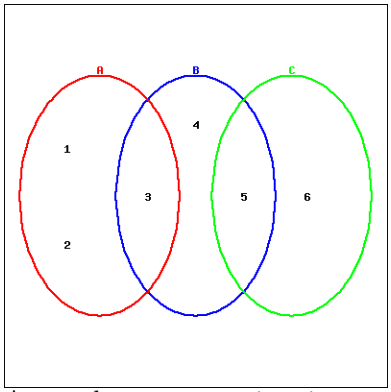
____

Correct Answers:

- 0.4

+6pc-1pc

Problem 22



A sample space contains six sample points and events A, B, and C as shown in the Venn diagram. The probablities of the sample points are $P(1) = 0.05$, $P(2) = 0.6$, $P(3) = 0.05$, $P(4) = 0.1$, $P(5) = 0.05$, $P(6) = 0.15$.

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

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

(b) $P(A|B) =$ _____

(c) $P(\overline{B}|\overline{C}) =$ _____

Correct Answers:

- 0.8
- 0.25
- 0.8125