Chapter 5: Probability: What Are The Chances?

1. Research on eating habits of families in a large city produced the following probabilities if a randomly selected household was asked “How often during the week do you have a vegetarian (meatless) main dish at dinnertime?”

|  |  |
| --- | --- |
| **Outcome** | **Probability** |
| Three or more times a week | 0.06 |
| Twice a week | 0.10 |
| Once a week | 0.49 |
| Never | ? |

What is the probability that a randomly selected household never has a vegetarian main dish at dinnertime?

A. 0.65

B. 0

C. 0.35

2. A game consists of drawing three cards at random from a deck of 52 playing cards. You win 3 points for each red card that is drawn. It costs 2 points each time you play. For one play of this game, the sample space *S* for the net number of points you gain (after deducting the cost of play) is

A. *S* = {−2, 1, 4, 7}

B. *S* = {0, 1, 2, 3}

C. *S* = {0, 3, 6, 9}

3. The probability of a randomly selected person being left-handed is . Which one of the following best describes what this means?

A. If a very large number of people are selected, the proportion of left-handed people will be very close to .

B. For every 700,000 people selected, 100,000 will be left-handed.

C. If we get 4 left-handed people in 4 consecutive random selections, the probability that the next person is left-handed is substantially lower than .

4. In the wild, 400 randomly selected blooming azalea plants are observed and classified according to flower petal color (white, pink, or orange) and whether or not they have a fragrance. The table gives the results.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **White** | **Pink** | **Orange** | Totals |
| **Fragrance** | **22** | **104** | **140** | 266 |
| **No Fragrance** | **98** | **16** | **20** | 134 |
| Totals | 120 | 120 | 160 | 400 |

If a single azalea plant is selected at random, which one of the following is the probability that it has pink flower petals *or* no fragrance?

A. 0.04.

B. 0.635.

C. 0.595.

5. In the wild, 400 randomly selected blooming azalea plants are observed and classified according to flower petal color (white, pink, or orange) and whether or not they have a fragrance. The table gives the results.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **White** | **Pink** | **Orange** | Totals |
| **Fragrance** | **22** | **104** | **140** | 266 |
| **No Fragrance** | **98** | **16** | **20** | 134 |
| Totals | 120 | 120 | 160 | 400 |

If a single azalea plant is selected at random and found to be orange, what is the probability that it has no fragrance?

A. 0.05.

B. 0.125.

C. 0.149.

6. In the wild, 400 randomly selected blooming azalea plants are observed and classified according to flower petal color (white, pink, or orange) and whether or not they have a fragrance. The table gives the results.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **White** | **Pink** | **Orange** | Totals |
| **Fragrance** | **22** | **104** | **140** | 266 |
| **No Fragrance** | **98** | **16** | **20** | 134 |
| Totals | 120 | 120 | 160 | 400 |

Suppose a single azalea plant is chosen at random. Which of the following expressions establishes that the events “Fragrance” and “Pink” are independent?

A. .

B. .

C. .

7. Suppose we toss a fair penny and a fair nickel. Let A be the event that the penny lands heads and B be the event that the nickel lands tails. Which one of the following is true about events A and B?

A. A and B are disjoint.

B. A and B are complements.

C. A and B are independent.

8. You want to perform a simulation to estimate the probability of getting at least one run of 3 heads in a row in 10 flips of a fair coin. Which of the following describes a correct simulation for estimating this probability?

A. Assign the numbers 0 through 4 to “heads” and 5 through 9 to “tails.” Read 500 1-digit numbers from a random digits table and count how many times you get runs of three or more heads in a row. Divide the count by 500.

B. Assign the numbers 0 through 4 to “heads” and 5 through 9 to “tails.” Read 10 one-digit numbers from a random digits table, and count this simulation as a “success” if there is at least one run of 3 or more heads. Repeat this 500 times and divide the total number of “successes” by 500.

C. Flip a coin 10 times. Count the 10 flips as a “success” if there are at least 3 heads in that set of 10 flips. Repeat this 500 times and divide the total number of “successes” by 500.

9. In a large city, 82% of residents own a cell phone. Suppose that we randomly select three city residents. What is the probability that at least one of the three residents does *not* own a cell phone? [The city is large enough so that we can assume independence].

A. 0.994

B. 0.449

C. 0.006

10. A jar contains 10 red marbles and 15 blue marbles. If you randomly draw two marbles from the jar (without replacement), what is the probability that they are the same color?

A. 0.5

B. 0.15

C. 0.52

11. A blood test for a certain disease has a false positive rate of 0.01 and a false negative rate of 0.05. (Recall that “false positive” means the test returns a positive result when the subject does not have the disease). Suppose that 2% of a certain population has the disease. If a random individual from this population tests positive, what is the probability that this person actually has

the disease?

A. 0.019

B. 0.0288

C. 0.6597

12. A survey of high school students finds that 80% of them get news on current events from the internet, 25% of them get news from television, and 15% use both sources. Which of the following is an accurate Venn diagram of this information? [Let “I” = Get news from internet and “T” = Get news from Television.]

A.

I

T

.95

.15

.40

.15

B.

I

T

.65

.15

.10

.15

C.

I

T

.80

.15

.25

0