Proving Independence using conditional probability.

1. A random survey was taken to gather information about grade level and car ownership status of students at a school. This table shows the results of the survey**. Decimal answers.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Car Ownership by Grade** | | | |
|  | **Owns a Car** | **Does Not Own a Car** | **TOTAL** |
| **Junior** | 6 | 10 | 16 |
| **Senior** | 12 | 8 | 20 |
| **TOTAL** | 18 | 18 | 36 |

1. P(Owns a Car) =\_\_\_\_\_\_\_\_\_\_\_ P(Owns a Car|Junior) =\_\_\_\_\_\_\_\_\_\_ Ind or Dep?\_\_\_\_\_\_\_

1. P(Junior)=\_\_\_\_\_\_\_\_\_\_\_ P(Junior|Do not own a Car)=\_\_\_\_\_\_\_\_\_ Ind or Dep?\_\_\_\_\_\_\_\_

**2. Gender vs. Commute** –Is your commute to work related to whether or not you are male or female? Use the data below to see if commute time is independent or dependent on gender..

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Under 30 minutes | Between 30 minutes and an hour | Over an hour |  |
| Male | 65 | 24 | 15 |  |
| Female | 64 | 22 | 7 |  |
|  |  |  |  |  |

By finding various probabilities from the table above, decide whether or not a person’s gender is related to their commute time to work. Write your conclusion below and include any relevant calculations.

P(female)=\_\_\_\_\_\_\_\_\_ P(female|under 30 minutes) \_\_\_\_\_\_\_\_\_\_\_\_ Ind. or Dep?\_\_\_\_\_\_\_\_\_

P(male)=\_\_\_\_\_\_\_\_\_\_\_ P(male|over an hour)\_\_\_\_\_\_\_\_\_\_ Ind or Dep?\_\_\_\_\_\_\_\_\_

1. A car dealer surveyed 240 men and 285 women about their vehicles. Of those surveyed, 155 men and 70 women said they own a red vehicle. If a person is chosen at random from those surveyed, what is the probability of choosing a woman **or** a person that owns a red vehicle?

Decide which formula to use for each word problem. Then find the probability.



Addition Rule

Conditional Probability

Multiplication Rule for Independent Events

1. Given a bag of 3 red marbles, 4 blue marbles, 1 yellow, and 2 green marbles. A student reaches into the bag and picks a marble. What is the probability that the marble is blue **or** green?

1. A box contains 100 good batteries and 2 defective batteries.

a. If 2 are selected at random **with** replacement, find the probability that

one is defective **and** the other is not.

b. If 2 are selected at random **without** replacement, find the probability that

they are both defective.

1. Suppose that the probability of Bill eating pizza on Friday night is 34%. The probability of Bill eating pizza and watching a movie on Friday night is 27%. What is the probability Bill watches a movie on Friday, **given** he ate pizza that night?
2. A teacher has 9 red crayons, 4 blue crayons, 7 purple crayons, and 5 black crayons in a basket, find the probability of he or she picking a blue crayon and then a black crayon **without replacing** the first one?

8. For **P( A and B)**, how do you know when to use the Multiplicaton Rule or Overlapping?