**11.2 Independence**

Two events are independent if $P\left(A\right)\*P\left(B\right)=P(A∩B)$. Use this formula to determine if the following probabilities are independent or not.

1. The P(A) = 0.42, P(B) = 0.25, and P(A $∩$ B) = 0.32.
2. The P(A) = 0.5, P(B) = 0.2, and P(A $∩$ B) = 0.1.
3. The P(A) = 0.5, P(B) = 0.32, and P(A $∩$ B) = 0.16.
4. The P(A) = 0.25, P(B) = 0.25, and P(A $∩$ B) = 0.25.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Dance | Sports | TV | Total |
| Men | 2 | 10 | 8 | 20 |
| Women | 16 | 6 | 8 | 30 |
| Total | 18 | 16 | 16 | 50 |

The above table represents the favorite leisure activities for 50 adults. Use it to answer the following:

A. Find the probability of male.

B. Find the probability of TV.

C. Find the probability of P(male ∩ TV).

D. Is being male and watching TV independent?

1. Jaron has a dozen cupcakes. Three are chocolate with white frosting, two are chocolate with

Yellow frosting, four are vanilla with white frosting, and three are vanilla with yellow frosting.

Are cake flavor and frosting color independent?

The **conditional probability** formula is $P\left(B\right)=\frac{P(A∩B)}{P(B)}$

1. A bakery sells vanilla and chocolate cupcakes with white or blue icing.

|  |  |  |  |
| --- | --- | --- | --- |
|  | White | Blue | Total |
| Vanilla | 3 | 5 | 8 |
| Chocolate | 6 | 7 | 13 |
| Total | 9 | 12 | 21 |

Find:

A) P(Vanilla | Blue)

B) P(White | Chocolate)

C) Alex’s favorite cupcake is chocolate with blue icing. What is the probability he will get his favorite cupcake if all the vanilla cupcakes have already been sold?



1. Use the Venn diagram above to answer the following questions.

A) P(After School Job | Male) B) P(Female | No After School Job)

C) P(No After School Job | Male) D) P(Male | After School Job)

E) Is the probability of having an after school job given you are male the same as the probability of being male given that you have an after school job? Use the probabilities in A and D to justify your answer.

F) A student works at McTaco Chimes what is the probability the student is female?

1. Use the table to answer the questions.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Bus | Private Car | Walk | Total |
| Male | 146 | 166 | 82 | 394 |
| Female | 154 | 185 | 64 | 403 |
| Total | 300 | 351 | 146 | 797 |

Use the table above to answer the following questions.

A) P(Walk | Female) B) P(Male | Private Car) C) P(Bus | Male) D) P(Female | Doesn’t Walk)

E) What is the probability that Melissa rides the bus? Write the conditional probability equation and then find the probability.

F) Jordan walks to school. What is the probability Jordan is male? Write the conditional probability equation and then find the probability.

16. 30% of students prefer math class and 12% of students prefer winter. What would the p(math $∩$ winter) have if these two events are independent.

17. 16% of students prefer The Utes and 10% of students prefer pickles. What would the p(Utes $∩$ pickls) have if these two events are independent.

18. P(snow)=0.4 and p(tripping on your shoelace) = .02. Presuming they are independent events what is the p(snow $∩$ tripping on your sholace)?

19. 33% of students prefer pepsi and 18% prefer a cookie. What would the P(pepsi $∩$ cookie) have to be if these two events are independent?