

MATH 210 FINITE MATHEMATICS

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7.5 Conditional Probability and Independence

Example 1

A survey was done of students playing video games / board games.

	play games (G)	does not play games (G^c)	Total
Female (F)			
Male (F^c)			
Total			

A student was selected randomly.

1. What is the probability that the student plays game?
2. What is the probability that the student does not play games?
3. What is the probability that the student is a female that plays game?
4. What is the probability that the student is a male that plays game?
5. Given the student is female, what is the probability that she plays games?
6. Given the student plays game, what is the probability the student is female?

Definition 1: Conditional Probability

The probability that event B occurs given that event A has already occurred is given by

which can be rewritten as

.

Example 2

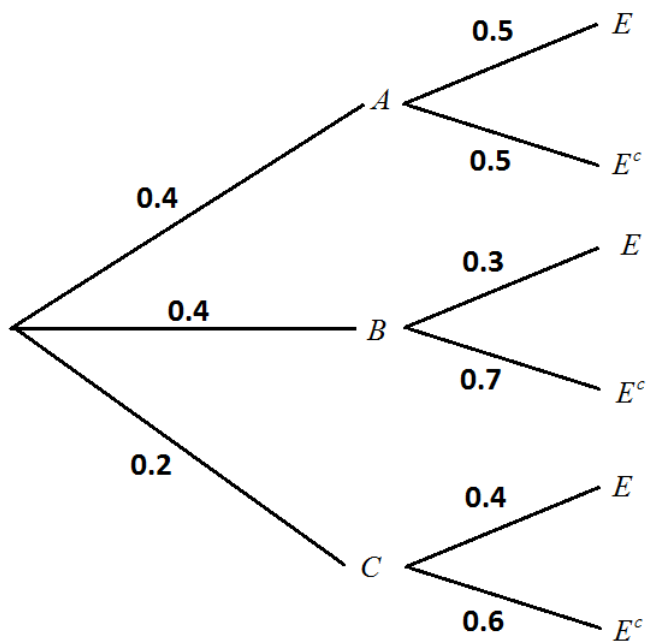
Consider the tree diagram to help understand the formula

Definition 2: Independent Events

If A and B are independent events, then

Example 3

Consider the tree diagram. Find the following



1. $P(A)$
2. $P(E|A)$
3. $P(A \cap E)$
4. $P(E)$
5. Does $P(A \cap E) = P(A) \cdot P(E)$?
6. Are A and E independent?

Example 4

There 100 students in this class, of which 58 are male and 42 are female. It is known that 80% of the males and 60% of the females buy popcorn at the movies. If a student is selected at random, what is the probability that the student

1. is a female who does not buy popcorn?

2. is a male that buys popcorn?

3. is a female that buys popcorn?

4. buys popcorn?

Example 5

10 M&Ms are placed in a bag (4 green, 6 blue). Two M&Ms are drawn in succession. What is the probability the second M&M is green if

1. the first M&M is blue?
2. the second M&M is drawn without replacing the first?
3. the first M&M is replaced before the second is drawn?