

Your mother tells you that you can go downtown by either the GO Train, or by taxi.

Does this mean you can take a taxi to the GO Train?

Introductory Probability

Types & terminology | Basic formula | Activating prior learning | Sum and product rule | Independent AND| OR | Venn Diagrams | Dependent Probability

"Either or" vs. "Or"



"Or" = Add

Given: two independent events A and B. Each event has a certain probability of occurring.

Wanted: the probability of one or the other event occurring (i.e. A "or" B occurring).

Achtung!

What is the difference between the following two questions?

1. Do you want lettuce or tomatoes on your sub?
2. Is your period one class English or Math?

1. Do you want lettuce or tomatoes on your sub?

2. Is your period one class English or Math?

This is unclear. You can do both, but you can also have an "either or" situation.

This is clearly an "either or" situation. You can't do both.

If it were "either or", how would you solve it?

Example 1: Michael estimates that his probability of passing Mathematics is 0.8 and his probability of passing English is 0.9. Find the probability that Michael

a. will pass Mathematics or English.

Outcome	Probability
Pass both Math and English <small>$P(M \cap E)$</small>	0.72
Pass Math, Fail English <small>$P(M \cap E^c)$</small>	0.08
Fail Math, Pass English <small>$P(M^c \cap E)$</small>	0.18
Fail both courses <small>$P(M^c \cap E^c)$</small>	0.02

0.98



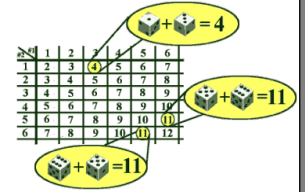
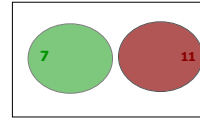
b. will pass either Mathematics or English.

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0.26



Example 2: Jeffrey wins at a dice game if he rolls a 7 or an 11 when rolling two standard dice. What is his probability of winning on a single roll?



$$P(7 \cup 11) = P(7) + P(11) - P(7 \cap 11)$$

From this chart, we see that there are six ways of rolling a sum of 7, and two ways of rolling a sum of 11. As well, recall that there are 36 total outcomes. Thus, in mathematical notation, $n(S) = 36$ and $n(A) = 8$, where A is the event of rolling a sum of 7 or 11.

Thus, the probability of rolling a 7 or 11 with a pair of dice is $2/9$.
Chart found at <http://www.shodor.org/interactivate/discussions/pdf6.html>, on September 3, 2004.

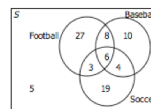
1. Nine members of a baseball team are randomly assigned field positions. There are three outfielders, four infielders, a pitcher, and a catcher. Given that the regular outfielders have been placed in the outfield, determine the probability that Troy will be assigned to play

- catcher
- outfielder

2. A standard deck of cards is shuffled and three cards are selected.

- What is the probability that the third card is either a red face card or a king if the king of diamonds and the king of spades are selected as the first two cards?
- Does this probability change if the first two cards selected are the queen of diamonds and the king of spades? Explain.

3. A recent survey of a group of students found that many participate in baseball, football, and soccer. The Venn diagram below shows the results of the survey.



- How many students participated in the survey?
- How many of these students play both soccer and baseball?
- How many play only one sport?
- How many play football and soccer?
- How many play all three sports?
- How many do not play soccer?

4. A survey of 1000 television viewers conducted by a local television station produced the following data:
- 40% watch the news at 1200
 - 60% watch the news at 1800
 - 50% watch the news at 2300
 - 25% watch the news at 1200 and at 1800
 - 20% watch the news at 1200 and 2300
 - 20% watch the news at 1800 and 2300
 - 10% watch all three news broadcasts
- a) What percent of those surveyed watch at least one of these programs?
b) What percent watch none of these news broadcasts?
c) What percent view the news at 1200 and at 1800, but not at 2300?
d) What percent view only one of these three shows?
e) What percent view exactly two of these shows?

Answer Clues:

- 1a) 1/6
b) 0%
- 2a) 12%
b) no
- 3a) 82
b) 10
c) 56
d) 9
e) 6
f) 50
- 4a) 95%
b) 5%
c) 45%
d) 50%
e) 35%