Complements and Unions of Events (Section 13.2)

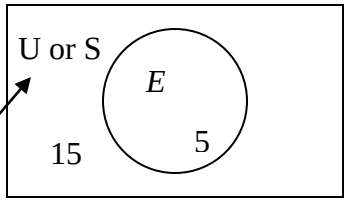
The objectives for this section include:

1. Understand the relationship between the probability of an event and the probability of its complement.
2. Calculate the probability of the union of two events.
3. Use complement and union formulas to compute the probability of an event.

Class Practice – What is the probability that the total showing on a pair of dice is less than 12? (Hint: see page 722 for the sample space)

The Probability of the Complement of an Event
If E is an event, then $\boldsymbol{P(E') = 1 - P(E)}$

Ex. $P(E') = 1 - \frac{5}{20} =$ _____



The universal set is also labeled the sample space

Class Practice –

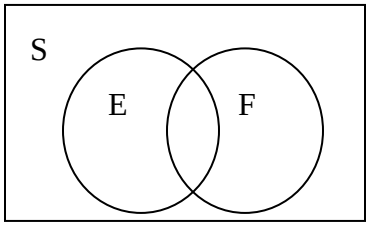
a) If the probability that it will rain is 0.35, what is the probability that it will not rain?

b) If two dice are rolled, find the probability that neither die shows a multiple of 3.

Complete **Quiz Yourself** **4** on p. 739

Rule for Computing the Probability of a Union of Two Events.

If E and F are events, then $\boldsymbol{P(E \cup F) = P(E) + P(F) - P(E \cap F)}$



Ex. Let $P(E) = 0.2$, $P(F) = 0.3$, $P(E \cap F) = 0.05$

Find $\boldsymbol{P(E \cup F)}$

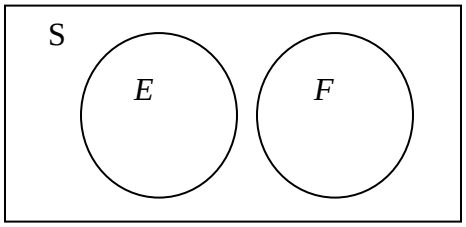
Class Practice –

a) If a single card is drawn from a standard deck, what is the probability that it is either a face card or a diamond?

b) If $P(C \cup D) = 0.8$, $P(C) = 0.5$, $P(D) = 0.47$, find $P(C \cap D)$.

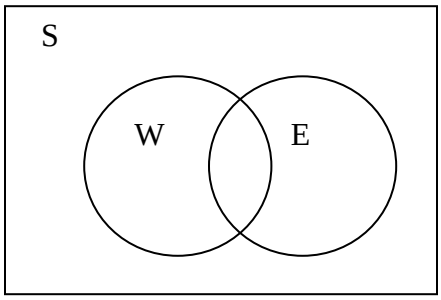
Complete **Quiz Yourself** (5) on p. 741

If E and F have no outcomes in common, they are called mutually exclusive events. In this case, because $E \cap F = \varnothing$, the formula above simplifies to $\boldsymbol{P(E \cup F) = P(E) + P(F)}$



Class Practice – If a single card is drawn from a standard deck, what is the probability that you draw a heart or a diamond?

Class Practice – Assume W and E are events in S such that $P(W) = 0.7$, $P(E) = 0.5$, and $P(W \cap E) = 0.3$. Determine each of the following, showing your work for each .



a. $P(W') =$ _____

b. $P(S) =$ _____

c. $P(W - E) =$ _____

d. $P(W' \cup E') =$ _____

Class Practice – Determine whether the statement is true of false for events *C* and *D*. Explain your answer.

$$P(C \cup D) - P(C) = P(D)$$

Review Problems

How many poker hands can be constructed made up of four aces?

How many ways can you arrange all the letters in "suppers"?

Assignment for Friday 10/23

Read pp. 737-743, Finish pp. 49-51 in your Guided Notes
Complete #1, 2, 5, 6, 9-15, 17, 19, 20, 21, 29, 30, 33, 34 37, 38 on pp. 743-745
& Section 13.2 Handout