

Fall 2006
Week-in-Review #7
courtesy: Kendra Kilmer
(covering Sections 7.1, 7.2, 7.3, and 7.4)

Section 7.1

- An **experiment** is an activity with an observable result.
 - The **outcome** or **sample point** is the observed result.
 - The **sample space**, S , is the set of all possible outcomes.
 - An **event** is a subset of the sample space.
 - All set operations (union, intersection, complement) are valid with events.
 - Two events are **mutually exclusive** if $E \cap F = \emptyset$
 - The **impossible event** is the empty set. The **certain event** is the sample space.
1. Let $S = \{5, 6, 7, 8, 9, 10\}$, $E = \{5, 8, 10\}$, $F = \{7, 8, 9, 10\}$, $G = \{6, 7\}$.
- (a) Find the event $(E \cup F \cup G)^c$
 - (b) Find the event $E \cup (F \cap G)^c$
 - (c) Are the events E and G mutually exclusive?
 - (d) Are the events E and G complementary?
2. An experiment consists of rolling a six-sided die and drawing one marble out of a bowl containing 3 red and 7 blue marbles.
- (a) Find the sample space associated with the experiment.
 - (b) Find the event, E , that an even number is rolled.
 - (c) Find the event, F , that a green marble is selected.
3. Chris purchased shares of IBM and Dell. Let E be the event that the IBM shares increase in value over the next year and let F be the event that the Dell shares increase in value over the next year. Use \cap , \cup , c to describe the following events:
- (a) The IBM shares do not increase in value.
 - (b) The IBM shares and the Dell shares do not increase in value.
 - (c) The shares of at least one of the two companies increase in value.
 - (d) The shares of only one of the two companies increase in value.

Sections 7.2 and 7.3

- Suppose we repeat an experiment n times and an event E occurs m of those times. Then $\frac{m}{n}$ is called the **relative frequency** of the event E .
 - The **probability of an event** is a number between 0 and 1 that represents the likelihood of the event occurring. The larger the probability, the more likely the event is to occur.
 - An event which consists of exactly one outcome is called a **simple event** of the experiment.
 - The table that lists the probability of each outcome in an experiment is known as the **probability distribution**.
 - For a **uniform sample space** with n outcomes the probability of each outcome is $\frac{1}{n}$.
 - To find the probability of an event E , add the probabilities of the simple events of E . Recall $P(\emptyset) = 0$ and $P(S) = 1$.
 - Rules of Probability
 - $P(E \cup F) = P(E) + P(F) - P(E \cap F)$
 - If E and F are mutually exclusive, then $P(E \cap F) = 0$
 - $P(E) = 1 - P(E^c)$
4. An experiment consists of randomly selecting 2 chips from a bowl containing 3 chips numbered 1 through 3.
- (a) Find the sample space.
- (b) Find the simple events associated with the experiment.
5. A marble is selected at random from a bowl containing 3 blue, 6 yellow, and 8 orange marbles and the color is observed. Find the probability distribution for this experiment.
6. Two fair six-sided dice are rolled. What is the probability that the sum is at least 10 or exactly 1 five is rolled?
7. A survey was conducted of 80 freshmen. It was found that 50 students play intramural soccer, 60 students play intramural basketball, and 10 students play neither of the two sports. If a student is selected at random, what is the probability that they play exactly one of the two sports?

Section 7.4

- If S is a uniform sample space then $P(E) = \frac{n(E)}{n(S)}$.

8. A bowl contains 30 red marbles, 15 green marbles, and 28 yellow marbles. An experiment consists of randomly selecting 5 marbles without replacement.
- (a) What is the probability of selecting exactly 2 red marbles?
- (b) What is the probability of selecting at least 1 green marble?
- (c) What is the probability of selecting exactly 3 marbles of the same color?
9. Three cards are randomly selected from a deck of 52. What is the probability of selecting a pair?
10. An exam consists of 10 multiple choice questions each have 5 choices. If a student randomly guesses on each question, what is the probability of the student passing the exam (i.e. answering at least 6 questions correctly?)
11. A shipping carton contains 20 radios. Before shipping, an inspector randomly selects 3 radios for testing. If any of the radios are defective, the carton is not shipped. If it is known that the carton contains 5 defective radios, what is the probability of shipping this carton?