**Section 5.2 - Probability Rules** (pp. 305-314)

**1. Definitions**

* **Sample Space** -
* **Probability Model** -
* **Event** -
* **Mutually Exclusive** -

**Example:**

**2. Basic Rules of Probability**

* The probability of any event is
* All possible outcomes together must have
* If all possible outcomes in a sample space are equally likely, the probability that event A occurs can be found using the formula
* The probability that an even does not occur is
* If two events have no outcomes in common, the probability that one or the other occurs is

**Basic Probability Rules**

* For any event A, .
* If is the sample space in a probability model, .
* In the case of equally likely outcomes,
* Complement rule: .
* Addition rule for mutually exclusive events: If A and B are mutually exclusive,

**Example** - Randomly select a student who took the 2013 AP Statistics exam and record the student’s score. Here is the probability model:

 **Score** 1 2 3 4 5
 **Probability** 0.233 0.183 0.235 0.224 0.125

(a) Show that this is a legitimate probability model.

(b) Find the probability that the chosen student scored 3 or better.



**3. Two-Way Tables and Probability**

When we are trying to find probabilities involving two events, a two-way table can display the sample space in a way that makes probability calculations easy.

**Example** - What is the relationship between educational achievement and home ownership? A random sample of 500 people who participated in the 2000 census was chosen. Each member of the sample was identified as a high school graduate (or not) and as a homeowner (or not). The two-way table displays the data.

|  |  |  |  |
| --- | --- | --- | --- |
|  | High School Grad | Not a HS Grad | Total |
| Homeowner | 221 | 119 | 340 |
| Not a homeowner | 89 | 71 | 160 |
| Total | 310 | 190 | 500 |

Suppose we choose a member of the sample at random. Find the probability that the member

(a) is a high school graduate.

(b) is a high school graduate and owns a home.

(c) is a high school graduate or owns a home.

**General Addition Rule for Two Events**

If A and B are any two events resulting from some chance process, then



**4. Venn Diagrams and Probability**

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**Examples** – pp. 312-13

**Application:** According to the National Center for Health Statistics, in December 2012, 60% of US households had a traditional landline telephone, 89% of households had cell phones, and 51% had both. Suppose we randomly selected a US household in December 2012.

1. Make a two-way table that displays the sample space of this chance process.
2. Construct a Venn diagram to represent the outcomes of this chance process.
3. Find the probability that the household has at least two types of phones.
4. Find the probability that the household has a cell phone only.

HW - 27, 29, 31-36, 43-55 odd