AP Stats Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Conditional Probability and General Multiplication Rule

1. **Flipping a Coin:** What is the probability of obtaining five heads in a row when flipping a coin?

1. **Traffic Fatalities:** The following data represent the number of traffic fatalities in the United States in 2005 by person type for male and female drivers.

|  |  |  |  |
| --- | --- | --- | --- |
| **Person Type** | **Male** | **Female** | **Total** |
| Driver | 20,795 | 6,598 | **27,393** |
| Passenger | 5,190 | 4,896 | **10,086** |
| **Total** | **25,985** | **11,494** | **37,479** |

* 1. What is the probability that a randomly selected traffic fatality who was female was a passenger?
  2. What is the probability that a randomly selected passenger fatality was female?
  3. Suppose you are a police officer called to the scene of a traffic accident with a fatality. The dispatcher states that the victim was driving, but the gender is not known. Is the victim more likely to be male or female? Why?

1. **Income by Region:** According to the U.S. Census Bureau, 19.1% of U.S. households are in the Northeast. In addition, 4.4% of U.S. households earn $75,000 per year or more and are located in the Northeast. Determine the probability that a randomly selected U.S. household earns more than $75,000 per year, given that the household is located in the Northeast.

1. **Cigar Smoking:** The data in the following table show the results of a national study of 137,243 U.S. men that investigated the association between cigar smoking and death from cancer. **Note:** “Current cigar smoker” means cigar smoker at time of death.

|  |  |  |
| --- | --- | --- |
|  | **Died from Cancer** | **Did Not Die from Cancer** |
| Never Smoked Cigars | 782 | 120,747 |
| Former Cigar Smoker | 91 | 7,757 |
| Current Cigar Smoker | 141 | 7,725 |

* 1. What is the probability that a randomly selected individual from the study who died from cancer was a former cigar smoker?
  2. What is the probability that a randomly selected individual from the study who was a former cigar smoker died from cancer?

1. **High School Dropouts:** According to the U.S. Census Bureau, 8.4% of high school dropouts are 16- to 17-year-olds. In addition, 6.2% of high school dropouts are white 16- to 17year-olds. What is the probability that a randomly selected dropout is white, given that he or she is 16 to 17 years old?
2. **Defense System:** Suppose that a satellite defense system is established in which four satellites acting independently have a 0.9 probability of detecting an incoming ballistic missile. What is the probability that at least one the four satellites detects an incoming ballistic missile? Would you feel safe with such a system?

1. **Casino Visits:** According to a December 2007 Gallup poll, 24% of American adults have visited a casino in the past 12 months.
   1. What is the probability that 4 randomly selected adult Americans have visited a casino in past 12 months? Is this result unusual?
   2. What is the probability that 4 randomly selected adult Americans have *not* visited a casino in the past 12 months? Is this result unusual?

1. **Left-Handed People:** In a sample of 1000 people, 120 are left-handed. Two unrelated people are selected at random without replacement.
   1. Find the probability that both people are left-handed.
   2. Find the probability that neither person is left-handed.
   3. Find the probability that at least one of the two people is left-handed.

1. **Guessing**:A multiple-choice quiz has three questions. Each with five answer choices. Only one of the choices is correct. You have no idea what the answer is to any question and have to guess each answer.
   1. Find the probability of answering the first question correctly.
   2. Find the probability of answering the first two questions correctly.
   3. Find the probability of answering all three questions correctly.
   4. Find the probability of answering none of the questions correctly.
   5. Find the probability of answering at least one of the questions correctly.

1. **Birthdays**: Three people are selected at random. Find the probability that (a) all three share the same birthday and (b) none of the three shares the same birthday. Assume 365 days in a year.