Quiz 9: Basic Probability Rules

Taken on Wed Jan 28. You may work with a group of as many as 4 students, submitting one quiz with all names, provided that you all contribute to the work. You may use your notes.

For questions 1 – 3, suppose that you encounter two traffic lights on your commute to school. Based on past experience, you judge that the probability is .35 that the first light will be red when you get to it, .45 that the second light will be red, and .60 that at least one of the lights will be red. Let R1 be the event that the first light is red, and let R2 be the event that the second light is red.

1. Which of the following represents the event that at least one of the lights will be red?
   - R1 and R2
   - R1 or R2
   - R1 not R2

2. Show how to use the complement rule to determine the long-run percentage of days for which neither light will be red. Also calculate this probability.

3. Determine the probability that both lights will be red. Justify your answer, using a probability table or probability rules or Venn diagram.

For questions 4 – 5, consider that the 2006 Statistical Abstract of the United States reports that 36.1% of American households have a pet dog and 31.6% have a pet cat.

4. Does it follow from this information that 67.7% have a pet dog or a pet cat? Explain/justify your answer.

5. Based on the information given, what is the smallest possible value for the percentage of American households that have a pet dog or a pet cat? Also describe the circumstance in which this smallest possible value would be attained.