Due: Wednesday December 16th
Problem to be turned in: 3,5.

1. Suppose there are only thirteen teams with a non-zero chance of winning the next World Cup. Suppose those teams are Spain (with a 14% chance), the Netherlands (with a 11% chance), Germany (with a 11% chance), Italy (with a 10% chance), Brazil (with a 10% chance), England (with a 9% chance), Argentina (with a 9% chance), Russia (with a 7% chance), France (with an 6% chance), Turkey (with a 4% chance), Paraguay (with a 4% chance), Croatia (with a 4% chance) and Portugal (with a 1% chance).

   (a) What is the probability that the next World Cup will be won by a South American country?

   (b) What is the probability that the next World Cup will be won by a country that is not from South America?

2. A biologist is modeling the size of a frog population in a series of ponds. She is concerned with both the number of egg masses laid by the frogs during breeding season and the annual precipitation into the ponds. She knows that in a given year there is an 86% chance that there will be over 150 egg masses deposited by the frogs (event E) and that there is a 64% chance that the annual precipitation will be over 17 inches (event F).

   (a) In terms of E and F, what is the event "there will be over 150 egg masses and an annual precipitation of over 17 inches"?

   (b) In terms of E and F, what is the event "there will be 150 or fewer egg masses and the annual precipitation will be over 17 inches"?

   (c) Suppose the probability of the event from (a) is 59%. What is the probability of the event from 2b?

3. (a) Suppose we roll a die and so $S = \{1, 2, 3, 4, 5, 6\}$. Each outcome separately $\{1\}, \{2\}, \{3\}, \{4\}, \{5\}, \{6\}$ is an event. Suppose each of these events is equally likely. What must the probability of each event be? What axioms or properties are you using to come to your conclusion?

   (b) With the same assumptions as in (a), how would you determine the probability of an event like $E = \{1, 3, 4, 6\}$? What axioms or properties are you using to come to your conclusion?

   (c) If $S = \{1, 2, 3, ..., n\}$ and each single-outcome event was equally likely, what would be the probability of each of these events?

   (d) Suppose $E \subset S$ is an event. Explain how you could determine $P(E)$.

4. Suppose E and F are events in a sample space S. Suppose that $P(E) = 0.7$ and $P(F) = 0.5$.

   (a) What is the largest possible value of $P(E \cap F)$? Explain.

   (b) What is the smallest possible value of $P(E \cap F)$? Explain.

5. Please answer the following questions:

   (a) Will you try to install package R on a device and test it like a calculator ? If you tried then please state if you have been successful or not.

   (b) I will have one office hour on Wednesday from 2pm-3pm. Please confirm that you have noted this time.

   (c) We will follow the below schedule for classes:

      i. Monday: Meeting room will open at 8:55am. I will show a 5-10 minute non-class related but academically relevant video before class starts. Our class will begin at 9:10am. Please enter the room by 9:10am.

      ii. Wednesday: Quiz will open on Moodle at 8:45am. The quiz will be a short test from the previous Homework. It will close at 9:05am. Meeting room will open at 8:55am and class will start at 9:10am. Please enter the room by 9:10am.

      iii. Each class will divided into the following manner:

         A. Part 1- 9:10-9:45;

         B. Break: 9:45-9:50;

         C. Part 2: 9:50-10:25;

         D. Question/Comments:10:25-10:30.

      Please confirm that you have read the above.

   (d) Are you able to follow classes online ? Were you able to submit the online quiz on moodle ?

   (e) Is the audio clear during class lectures ? Do the notes display clearly.

   (f) Can I use the zoom chat channel to send out weekly notices or would you prefer emails ?