# Problem Set 5: Probability
## CS&SS Math Camp 2020

1. Suppose we have three groups.
   A = { Warren, Sarah Beth, Shane, Leah, Seth }
   B = { Michael, Elizabeth, Seth, Shane, David }
   C = { Emily, Megan, Ian, Leah }

   $A \cup B =$

   $A \cap B =$

   $B \cap C =$

   What do we call events B and C?

2. Suppose there is an urn with 1 blue, 1 green, 1 red, and 1 purple ball. I draw two out randomly. What is the sample space of this experiment? (i.e. what are the possible outcomes)

   Let R be the event that one of yours balls was red. $P(R) =$

   Let B be the event that one of yours balls was blue. $P(B) =$

$P(B^C) =$

$P(R \cap B) =$

$P(R \cup B) =$

$P(R|B) =$

Are the events R and B independent?

3. Let $A$ be the event that a student passes her qualifying exams for graduate school on the first try and $B$ be the event that the student attends Math Camp. Suppose $P(A) = 0.90$ and $P(A|B) = 0.95$. Are $A$ and $B$ independent? What does this say about the effectiveness of Math Camp?

4. The probability of infecting another household member with a certain strain of influenza during one day is 0.10. Suppose that in a household of four people, three of them are sick.

(a) What is the probability that the fourth person becomes infected during a single day of exposure to the three sick household members?

(b) What is the probability that the fourth person becomes infected during two days of exposure to the sick household members?