

# Problem Set 1

*Math 240, Fall 2015*

**Due Friday, September 18 by 2:00 p.m.**

1. Let  $A = \{2, 4, 6, 8\}$ ,  $B = \{3, 4, 5, 6\}$ , and  $C = \{5, 4\}$ . Which of the following statements are true?
  - a.  $\{6, 8\} \subseteq A$
  - b.  $C \subseteq (A \cap B)$
  - c.  $(B \cap C^c) \cap A = \{6\}$
  - d.  $(A \cap B^c) \cap C \subseteq B$
  - e.  $\emptyset \in A$
  - f.  $C \subseteq B$
  - g.  $(A \cup B) \cap C^c = \{2, 3, 6, 8\}$
  - h.  $A \cap B \cap C = 4$
2. Use two sets of Venn diagrams with three overlapping circles to illustrate each identity.
  - a.  $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
  - b.  $A \cap (B \cup C)^c = (A \cap B^c) \cap (A \cap C^c)$
3. A red die and a blue die are rolled and the number on each is recorded.
  - a. List the elements of the sample space.
  - b. List the elements of the following events:
    - $A$  = the sum of the two numbers is at least 9
    - $B$  = the blue die has a larger value than the red die
    - $C$  = the blue die is 5
  - c. List the elements of the following events
    - $A \cap B$
    - $B \cup C$
    - $A \cap (B \cup C)$