

Set Theory Homework  
Math 116  
Summer 2004  
Due 6/25/04

**Part I:** Let  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$  be the universal set. In the three problems below find the following sets:

- (a)  $A \cup B$
- (b)  $c(A \cup B)$
- (c)  $(A \cup B) \cap C$
- (d)  $A \cap B$
- (e)  $(A \cap B) \cup (D^c)$
- (f)  $(A \cup B) \cap (D \cup C)$
- (g)  $(A \cap C) \cup (B \cap D)$
- (h)  $(A \cap C^c) \cup (B^c \cap D)$

- 1.  $A = \{1, 2, 3, 4, 5\}, B = \{1, 4, 9, 11, 12\}, C = \{3, 5, 7, 8, 10, 11\}, D = \{2, 4, 6, 7, 8, 9, 10\}$
- 2.  $A = \{1, 3, 5, 7, 9, 11\}, B = \{3, 6, 9, 12\}, C = \{1, 3, 4, 5, 8, 9, 10\}, D = \{2, 5, 6, 8, 10, 12\}$
- 3.  $A = \{4, 6, 8, 9, 10, 11\}, B = \{1, 2, 5, 6, 9, 10\}, C = \{3, 4, 6, 7, 8, 9\}, D = \{1, 2, 3, 10, 11, 12\}$

**Part II:** Draw Venn diagrams shaded to represent the following sets:

- 1.  $(A \cap B) \cup (B \cap C)$
- 2.  $B \cap C^c$
- 3.  $(A \cap B) \cup (B \cap C^c) \cup (A \cap C^c)$
- 4.  $(B \cap A^c \cap C^c) \cup (A \cap B^c \cap C^c) \cup (C \cap A^c \cap B^c)$

**Part III:** Draw a Venn diagram with  $U = \{\text{all numbers}\}$  and  $A = \{\text{even numbers}\}, B = \{\text{multiples of 3}\}, C = \{\text{numbers that are spelled with an 'i'}\}$ . Fill in the numbers 1 - 20 in the appropriate places in the diagram.

**Part IV:** Ann, Brian, and Chris are three friends who like to see movies together. Ann wants to see Dodgeball (D), Garfield (G), Harry Potter (HP), Shrek 2 (S2), and The Stepford Wives (SW). Brian wants to see Dodgeball (D), Harry Potter (HP), Mean Girls (MG), Raising Helen (RH), and Shrek 2 (S2). Chris wants to see Harry Potter (HP), Mean Girls (MG), Saved (S), Shrek 2 (S2), and Troy (T).

- 1. Draw a Venn diagram that shows the movies that each friend wants to see [Let  $A, B, C$  be the sets of movies that Ann, Brian, and Chris want to see, respectively.] Use the diagram to answer the next questions.
- 2. On Friday, the three of them go to the movies. What movies do they all want to see?
- 3. On Saturday, only Ann and Brian can go to the movies; they decide to see a movie that they both want to see but Chris doesn't want to see. What are their choices?
- 4. On Sunday, only Brian and Chris can go to the movies; they also decide to see a movie that they both want to see but Ann doesn't want to see. What are their choices?