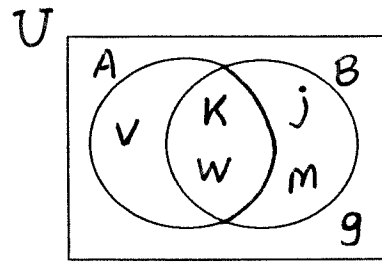


**MGF1106 TEST 1 REVIEW (15 POINTS) Name:**

- 1) Which collection is well-defined, and therefore a set?
  - a) The collection of successful NFL quarterbacks.
  - b) The collection of NFL quarterbacks who have been elected to the Pro Football Hall of Fame.
- 2) Write a word description for each set:
  - a) { Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday }
  - b) { 1, 2, 3, 4, ...35 }
- 3) Express each set using the roster method:
  - a) The set of U.S. states that share a border with California.
  - b)  $\{x \mid x \in \mathbf{N} \text{ and } 3 \leq x \leq 7\}$
- 4) Express each set using set-builder notation:
  - a) { 5, 6, 7, 8, ... }
  - b) { 1, 2, 3, ... 43 }
- 5) Write  $\in$  or  $\notin$  in each blank so that the resulting statement is true.
  - a)  $3 \underline{\hspace{1cm}} \{3, 4, 5\}$
  - b)  $5 \underline{\hspace{1cm}} \{4, 6, 7\}$
  - c)  $\{3\} \underline{\hspace{1cm}} \{3, 4, 5\}$
  - d)  $\{2\} \underline{\hspace{1cm}} \{\{2\}, \{3\}, \{2, 3\}\}$
- 6) What is the cardinal number of the empty set?
- 7) If  $A = \{5, 6, 7, 8\}$ , what is  $n(A)$ ?
- 8) If  $A = \{1, 2\}$ ,  $B = \{3, 4\}$ , and  $C = \{3, 4, 7\}$ , which statement is true?
  - a) set A is equal to set B
  - b) set B is equivalent to set C
  - c) set A is equivalent to (but not equal to) set B
- 9) Which set is finite?
  - a) { 6, 7, 8, 9, ... }
  - b)  $\{x \mid x \in \mathbf{N}\}$
  - c) { 1, 2, 3, ...76 }
- 10) Which set is infinite?
  - a)  $\{x \mid x \in \mathbf{N} \text{ and } x < 5\}$
  - b)  $\{x \mid x \in \mathbf{N} \text{ and } x > 5\}$
  - c) { 1, 2, 3, ... 35 }
- 11) Write  $\subseteq$  or  $\not\subseteq$  in each blank so that the resulting statement is true.
  - a)  $\{3\} \underline{\hspace{1cm}} \{3, 4\}$
  - b)  $\{2, 3\} \underline{\hspace{1cm}} \{2, 4, 5\}$
  - c)  $\{a, b\} \underline{\hspace{1cm}} \{a, b\}$
  - d)  $3 \underline{\hspace{1cm}} \{3, 5\}$
  - e)  $\{ \} \underline{\hspace{1cm}} \{2\}$
  - f)  $\{2\} \underline{\hspace{1cm}} \{\{2\}, \{3\}\}$
- 12) Determine whether  $\subseteq$ ,  $\subset$ , both, or neither can be placed in each blank to form a true statement.
  - a)  $\{5, 6, \} \underline{\hspace{1cm}} \{5, 6, 7\}$
  - b)  $\{c\} \underline{\hspace{1cm}} \{c\}$
  - c)  $\{3, 4, 5\} \underline{\hspace{1cm}} \{3, 4, 6\}$
  - d)  $\{a, b, c\} \underline{\hspace{1cm}} \emptyset$
- 13) Which statement is true?
  - a) If A is a subset of B, and B is a subset of C, then A is a subset of C.
  - b) If A is a proper subset of B, then there is some element of B that is not an element of A.
  - c) All of the above statements are true.
- 14) List all subsets of the set { 7, 8, 9 }
- 15) Calculate the number of subsets for each set:
  - a) { q, r, s, t }
  - b) { 4, 5, 6, ... 12 }
  - c) { }
- 16) Calculate the number of proper subsets for each set:
  - a) { 3, 4, 5, 6, 7 }
  - b) { }
  - c) { k }
- 17) If  $\mathbf{U} = \{1, 2, 3, 4, 5, 6, 7\}$ ,  $A = \{2, 4, 6\}$ ,  $B = \{2, 5, 7\}$  and  $C = \{1, 5, 7\}$ , find the following sets:
  - a)  $A'$
  - b)  $A \cup B$
  - c)  $A \cup C$
  - d)  $B \cap C$
  - e)  $A \cap C$
  - f)  $(A \cap B)'$
  - g)  $B \cup C'$

18) Use the Venn diagram at the right to represent each set in roster form:

- a)  $A' \cup B$   
 b)  $(A \cap B)'$



19) Construct a Venn diagram illustrating the given sets:  $U = \{d, e, f, g, h, i, j\}$ ,  $A = \{d, e, f, g\}$ ,  $B = \{g, h, j\}$

20) If set A contains 12 elements, set B contains 10 elements, and sets A and B have 5 elements in common, how many elements are in  $A \cup B$ ?

21) If A is any set, find the following: a)  $A \cup \{ \}$  b)  $\emptyset'$  c)  $A \cap U$  d)  $A \cup A'$

22) Construct a Venn diagram illustrating the given sets:

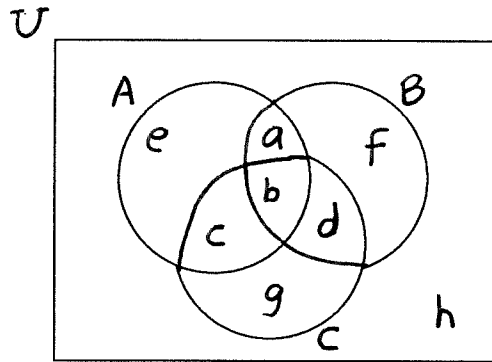
$U = \{1, 2, 3, 4, 5, 6, 7\}$ ,  $A = \{1, 2, 3\}$ ,  $B = \{2, 3, 4, 5\}$ ,  $C = \{3, 5, 6\}$

23) If  $U = \{a, b, c, d, e, f, g, h\}$ ,  $A = \{a, b, c\}$ ,  $B = \{c, f, g\}$ ,  $C = \{d, e, f, h\}$ , find the following sets:

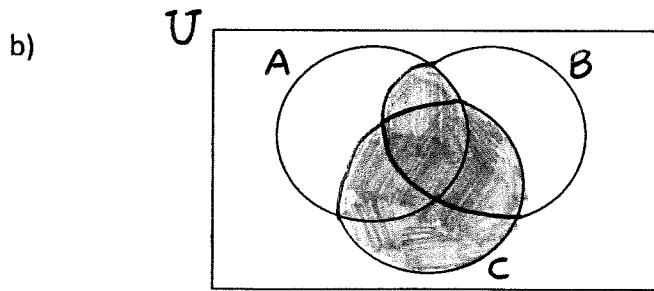
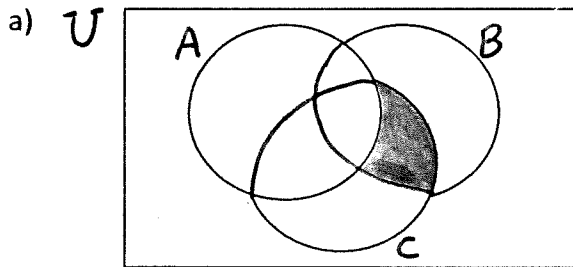
- a)  $A \cap (B \cup C)'$  b)  $(A \cup B) \cap C$  c)  $(A \cap C)' \cup B$

24) Use the Venn diagram at the right to represent each set in roster form:

- a)  $A \cap B$   
 b)  $(A \cup C) \cap B'$   
 c)  $A \cup (B \cap C)$



25) Describe each shaded region using symbols.



26) A survey of 100 travelers asked if they have visited the following Texas cities: Houston, Dallas, San Antonio.

- |                                        |                             |
|----------------------------------------|-----------------------------|
| 2 have visited all three cities        | 26 have visited Houston     |
| 10 have visited Houston and Dallas     | 32 have visited Dallas      |
| 7 have visited Houston and San Antonio | 23 have visited San Antonio |
| 9 have visited Dallas and San Antonio  |                             |

a) Construct a Venn diagram to represent this problem.

How many of these surveyed travelers have visited ...

- |                                            |                                 |
|--------------------------------------------|---------------------------------|
| b) only Dallas                             | f) only one of these cities     |
| c) Houston or Dallas, but not San Antonio  | g) only two of these cities     |
| d) Houston and Dallas, but not San Antonio | h) at least one of these cities |
| e) none of these cities                    |                                 |

**Answers:**

- 1) b  
 2) a) The set of days of the week.  
 b) The set of natural numbers less than 36.  
 3) a) { Oregon, Nevada, Arizona }  
 b) { 3, 4, 5, 6, 7 }

- 4) a)  $\{x \mid x \in \mathbf{N} \text{ and } x \geq 5\}$   
 b)  $\{x \mid x \in \mathbf{N} \text{ and } x \leq 43\}$

- 5) a)  $\in$  b)  $\notin$  c)  $\notin$  d)  $\in$

6) 0

7) 4

8) c

9) c

10) b

- 11) a)  $\subseteq$  b)  $\not\subseteq$  c)  $\subseteq$  d)  $\not\subseteq$  e)  $\subseteq$  f)  $\subseteq$

- 12) a) both b)  $\subseteq$  c) neither d) neither

13) c

- 14)  $\{ \}, \{7\}, \{8\}, \{9\}, \{7,8\}, \{7,9\}, \{8,9\}, \{7,8,9\}$

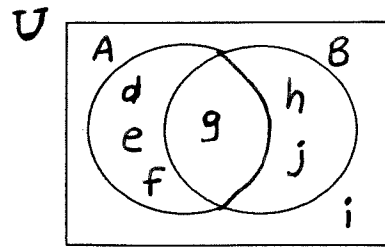
- 15) a) 16 b) 512 c) 1

- 16) a) 31 b) 0 c) 1

- 17) a) { 1, 3, 5, 7 }  
 b) { 2, 4, 5, 6, 7 }  
 c) { 1, 2, 4, 5, 6, 7 }  
 d) { 5, 7 }  
 e) { }  
 f) { 1, 3, 4, 5, 6, 7 }  
 g) { 2, 3, 4, 5, 6, 7 }

- 18) a) { k, j, w, m, g }  
 b) { v, j, m, g }

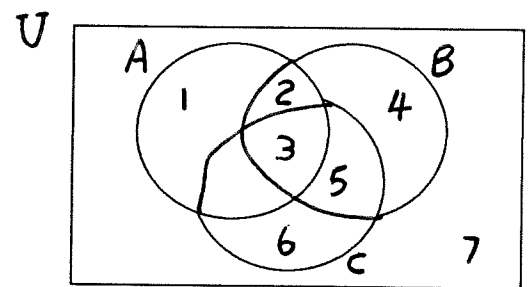
19)



20) 17

- 21) a) A b)  $\mathbf{U}$  c) A d)  $\mathbf{U}$

22)

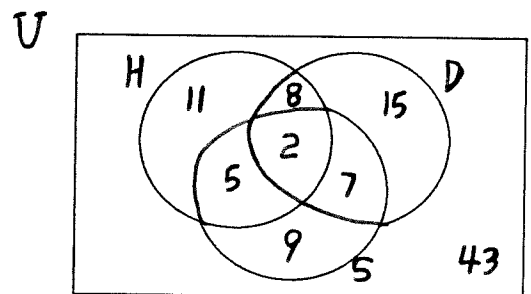


- 23) a) { a, b } b) { f } c) { a, b, c, d, e, f, g, h } =  $\mathbf{U}$

- 24) a) { a, b } b) { e, c, g } c) { e, a, b, c, d }

- 25) a)  $(B \cap C) \cap A'$  b)  $C \cup (A \cap B)$

26) a)



- b) 15  
 c) 34  
 d) 8  
 e) 43

- f) 35  
 g) 20  
 h) 57