

**MATH3 (814013) – SPRING 2007**

**WORKSHEET 2**

**Question (1):** Let  $A = \{ a, b, d, e \}$ ,  $B = \{ c, b, e, f \}$  and  $C = \{ f, g, h \}$ .

(1) Find:

$$A \cap B =$$

$$(A \cap B) \cup (A \cap C) =$$

$$A \cup B =$$

(2) True or false:

$a \notin A$	$d \subseteq A$	$\{b\} \subseteq B$
$A \cap C = \emptyset$	$A \cup B = C$	$\{g\} \in C$
$A \neq B$	$\{b, e\} \not\subset B$	$h \in C$

(3) Use one of the symbols:  $\in, \notin, \subseteq, \not\subset, =, \neq, \cup, \cap$ , in each blank to make true statement:

$a$ _____ $B$	$d$ _____ $A$	$\{b\}$ _____ $C$
$A$ _____ $B = \{b, e\}$	$A$ _____ $\emptyset = A$	$\{g\}$ _____ $C$

**Question (2):** Multiple choice questions:

(1) Indicate which of the following is true:

- (A) All natural numbers are integers.                      (B) All real numbers are irrational.  
(C)  $\sqrt{3}, \sqrt{4}, \sqrt{5}$  are irrational numbers.                      (D)  $\sqrt{-3}$  is irrational number.

(2) Indicate which of the following is false:

- (A) The empty set is a subset of any set.                      (B) Every set is a subset of itself.  
(c) Every set is a subset of universal set.                      (D) The empty set =  $\{\emptyset\}$

(3) The set of whole numbers between -3 and 4 is:

- (A)  $\{1, 2, 3, 4\}$                       (B)  $\{0, 1, 2, 3, 4\}$                       (C)  $\{0, 1, 2, 3\}$                       (D)  $\{-2, -1, 0, 1, 2, 3\}$

(4)  $\{x: -2 < x \leq 1, x \in N\} =$

- (A)  $\emptyset$                       (B)  $\{0, 1\}$                       (C)  $\{-1, 0, 1\}$                       (D)  $\{1\}$

- (5)  $\{x: -2 < x < 1, x \in N\} =$   
 (A)  $\emptyset$  (B)  $\{0,1\}$  (C)  $\{-1,0,1\}$  (D)  $\{1\}$
- (6)  $\{x: -2 < x \leq 1, x \in Z\} =$   
 (A)  $\emptyset$  (B)  $\{0,1\}$  (C)  $\{-1,0,1\}$  (D)  $\{1\}$
- (7)  $\{x: 3x + 2 = 4, x \in Z\} =$   
 (A)  $\emptyset$  (B)  $\{0,1\}$  (C)  $\{-1,0,1\}$  (D)  $\{1\}$
- (8) Let  $T = \left\{3, -1, 0, \sqrt{7}, \sqrt{9}, \frac{3}{2}, 2.43, 4.\bar{3}, 2\pi, \frac{5}{0}\right\}$ . The irrational numbers in  $T$  are:  
 (A)  $\left\{\sqrt{7}, \sqrt{9}, 4.\bar{3}, 2\pi, \frac{5}{0}\right\}$  (B)  $\{\sqrt{7}, 2\pi\}$   
 (C)  $\left\{\sqrt{7}, 2\pi, \frac{5}{0}\right\}$  (D) None of these
- (9) Indicate which of the following is true:  
 (A)  $W \subseteq N$  (B)  $N \in W$  (C)  $N \subseteq W$  (D)  $W \subset N$
- (10) Indicate which of the following is not true:  
 (A)  $N \subseteq W \subseteq Z \subseteq Q \subseteq R$  (B)  $\bar{Q} \subseteq R$  (C)  $Q \cup \bar{Q} = R$  (D)  $Q \cap \bar{Q} = \{\emptyset\}$

**Question (3):** What is wrong in the following statements: (Correct it)

- (1) All integers are natural numbers.
- (2)  $Q \in R$ .
- (3)  $4 \subseteq \{2,4,6\}$ .
- (4)  $3 \notin \{1,2,3\}$ .
- (5)  $\{a,b,c\} \subset \{a,b,c,d\}$ .
- (6)  $\{a,b,c,\dots,y,z\}$  is an infinite set.
- (7)  $\{x: x^2 = -25\} \neq \emptyset$ .
- (8) The number of all subsets of the set  $A = \{2,5,9\}$  is 9.

**Question (4):** Express the following sets by using the set-builder notation:

- (1)  $A = \{2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$
- (2)  $B = \{0, 1, 4, 9, 16, 25, 36, 49, \dots\}$
- (3)  $C = \{0, 1, 8, 27, 64, 125, \dots\}$
- (4)  $D = \{\text{Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday}\}$
- (5)  $E = \{a, b, c, d, \dots, y, z\}$

**Question (5):** Circle the correct answer for each of the following statements:

- (1) Let  $\Omega = \{A, B\}$ , where  $A = \{1, 2\}$  and  $B = \{3, 4\}$ . The set  $\Omega$  contains four elements.    T    F
- (2) The number 0 is an irrational number.    T    F
- (3) Let  $\phi$  denote the empty set. The set  $\{\phi\}$  contains no element.    T    F
- (4) If  $A \subseteq B$  and  $B \subseteq C$ , then  $A \subseteq C$ .    T    F
- (5) The number 0 is both an integer and a rational number.    T    F
- (6) If  $ab = 0$ , then either  $a$  or  $b$  have to be 0.    T    F
- (7) If  $ab = 1$ , then either  $a$  or  $b$  have to be 1.    T    F

**Question (6):** Show that  $c = 0.151515\dots$  is a rational number.

**Solution:**     $c = 0.151515\dots$

Then  $10c = 15.1515\dots$

$$10c - c = 15.1515\dots - 0.151515\dots$$

$$9c = 15$$

$$c = \frac{15}{9} = \frac{5}{3} \text{ Rational number}$$

*Where is the mistake in the above solution?*