Worksheet 5b

1. Replace "?" by the proper symbol, choosing from among the following:

$$\in, \subseteq$$

a. $\mathbb{N}$? $\mathbb{Z}$

b. $\{1, 2, 3\}$? $\mathbb{Z}$

c. $\{5\}$? $\mathbb{Z}$

d. 5 ? $\mathbb{Z}$

e. $\emptyset$? $\mathbb{Z}$

f. $\emptyset$? $\{\emptyset\}$

g. $\{\emptyset\}$? $\{\{\emptyset\}\}$

2. True or False

   a. $\mathbb{R} \cup (3,7) \subseteq \mathbb{R}$

   b. $(3,6) \cup (6,8) = (3,8)$

3. There are certain sets of real numbers that garner special notation (a and b denote real numbers throughout):

$(a,b) = x \in \mathbb{R}: a < x < b$	the open interval from a to b
$[a,b] = x \in \mathbb{R}: a \leq x \leq b$	the closed interval from a to b
$(a,\infty) = x \in \mathbb{R}: a < x$	the open ray from a to infinity
$[a,\infty) = x \in \mathbb{R}: a \leq x$	the closed ray from a to infinity
$(-\infty,b) = x \in \mathbb{R}: x < b$	the open ray from minus infinity to b
$(-\infty,b] = x \in \mathbb{R}: x \leq b$	the closed ray from minus infinity to b

   Create set definitions for the following notations

   a. $(a,b]$

   b. $[a,b)$

4. Complete the following equations

   a. $[6,8] \cup (5,7) =$

   b. $(6,8] \cap [5,7) =$

   c. $[2, \infty) \cap (-\infty, 9) =$

   d. $(-2,8) \cup [8,10) =$

   e. $(-2,8) \cap [8,10) =$

5. Let $A = \{x \in \mathbb{Z}: x \text{ is a multiple of } 7\}$ and $B = \{x \in \mathbb{Z}: x \text{ is a multiple of } 14\}$

   a. Prove or disprove: $A \subseteq B$

   b. Prove or disprove: $B \subseteq A$

6. Prove: $A \subseteq B$ if and only if $A \cap B^c = \emptyset$