Questions

1. Translate the following English sentences using set notation.

   (a) The set of all positive real numbers

   (b) The set of all real numbers greater or equal to 2 and less than 10

   (c) The set of all even numbers

   (d) The set of all real numbers that are less than 5 units away from 1

   (e) The set of all real numbers that are greater or equal to 6 units away from 2

2. Write the descriptions of the following sets in English.

  (a) $\{x \in \mathbb{R} | x \leq -3\}$

  (b) $\{x \in \mathbb{R} | |x - 3| < 2\}$

  (c) $\{x \in \mathbb{R} | x = 2k + 1 \text{ for some } k \in \mathbb{Z}\}$

  (d) $\{x \in \mathbb{R} | |3 - x| = 2\}$

3. Perform the set operation and graph the set.

  (a) $A = \mathbb{Z}, B = [1, 6]$. Find $A \cap B$

(b) $A = (-\infty, 0), B = [-2, 4]$. Find $A \cup B$

(c) $A = (-2, 0), B = [0, 4]$. Find $A \cap B$

(d) $A = (-4, 0), B = [-2, 5]$. Find $A \cap B$

(e) $A = \mathbb{Z}, B = (1, 5], C = \{1, 2, 3\}$. Find $C \cup (A \cap B)$

(f) $A = \emptyset, B = [0, 2]$. Find $A \cup B$ and $A \cap B$.