1. Determine if each of the following elements is in each set. Use $\in$ or $\notin$.
   
   (a) Is 5 an element of $\{0.5, 2, 10, 100\}$?
   
   (b) Is $\{5\}$ an element of $\mathbb{Z}$?
   
   (c) Is $\emptyset$ an element of $\{1, 2, 3\}$?
   
   (d) Is $\{1\}$ an element of $\{\{1\}\}$?
   
   (e) Is $\emptyset$ an element of $\emptyset$?

2. For each of the following sets $A$ and $B$ determine if $A$ is a subset of $B$. If not, find an element in $A$ which is not in $B$.
   
   (a) $A = \{2x \mid x \in \mathbb{Z}\}$ and $B = \{4x \mid x \in \mathbb{Z}\}$
   
   (b) $A = \{1, 2\}$ and $B = \{\{1, 2\}, 3\}$
   
   (c) $A = \emptyset$ and $B = \{1, 2\}$
   
   (d) $A = \{\emptyset\}$ and $B = \{1, 2\}$
   
   (e) $A = \{3 - 5x \mid x \in \mathbb{Z}\}$ and $B = \{8 + 5x \mid x \in \mathbb{Z}\}$

3. Give an example of a set $A$ with $\mathbb{Q} \subset A \subset \mathbb{R}$ and justify each $\subset$ by giving an element which is on the right but not on the left.

4. Write the set $\{x \mid x > 2.3$ and $x \leq 10\}$ in interval notation.

5. Find the power set of $\{1, 2, \emptyset\}$.

6. If $A = \{1, 2, 5, 6\}$ and $B = \{2, 3, 4, 5\}$ determine $A \cup B$, $A \cap B$ and $A - B$.

7. If the universal set is $U = \{1, 2, \ldots, 10\}$, $A = \{2, 7, 10\}$ and $B = \{7, 8, 9\}$ determine $A \cap B$.

8. Give an example of three sets $A$, $B$ and $C$ so that $B \neq C$ (justify!) but $B - A = C - A$ (justify!)