1. Let $R = \{(a, b) \in \mathbb{R} \times \mathbb{R} : 7 \text{ divides } a - b\}$. State five elements of R, with proper notation. Note, you must provide five examples of elements which, as a whole, helps someone truly see what kinds of things belong to R. This sounds like it's subjective, but it's not quite as subjective as it sounds. If you were only to provide $(7, 7) \in R$ and $(14, 14) \in R$ and such as elements of R, while true, you do not want your examples to mislead someone into a true understanding of the set R. Push the limits as much as possible. Go ahead and provide one or two tame elements of R, but be sure to give examples to show the actual variety of things that belong to R.

2. Let $R = \{(a, b) \in \mathbb{R} \times \mathbb{R} : 7 \text{ divides } a - b\}$. Note that R is a binary relation on $\mathbb{R}$. Prove R is reflexive.

3. Let $R = \{(a, b) \in \mathbb{R} \times \mathbb{R} : 7 \text{ divides } a - b\}$. Note that R is a binary relation on $\mathbb{R}$. Prove R is symmetric.

4. Let $R = \{(a, b) \in \mathbb{R} \times \mathbb{R} : 7 \text{ divides } a - b\}$. Note that R is a binary relation on $\mathbb{R}$. Prove R is transitive.

5. Based on the following set definitions:

   - $B = \{j\text{'s cat} : j \in T\}$
   - $L = \{z \in V \mid z \text{ scratches furniture}\}$
   - $S = \{m \in T : m \text{ plays hockey}\}$

   and hypotheses

   - H1: $B \subseteq L$.
   - H2: For all $c \in T$, if c is a baker and c's cat scratches furniture, then c wins GBBO.
   - H3: For all $a \in T$, if a does not wear a helmet, then a does not skateboard.
   - H4: For all $d \in J$, if d scratches furniture, then d does not wear a helmet.
   - H5: $J \subseteq V$.

   prove: for all $x \in S$, for all $y \in T$, if x is a baker and y skateboards, then x wins GBBO and y wears a helmet.