1. Define $A = \{1, 2, 3\}$ and $B = \{x, y, z, w\}$ and define the relation R from A to B by

$$R = \{(1, y), (3, x), (3, z), (2, w), (2, y), (3, y)(1, x)\}$$

   (a) Is it true that $3Rx$?

   (b) Is it true that $2Rx$?

   (c) List the elements in $\{n \in A \mid nRx\}$

   (d) List the elements in $\{\alpha \in B \mid 3R\alpha\}$

2. Define $A = \{1, 2, 3, 4, 5, 6\}$. Suppose I start defining the relation $R = \{(1, 3), (3, 5), (2, 6)\}$. Add as many elements as necessary to R (but no more than necessary) to make sure that the relation is reflexive, symmetric and transitive.

3. Define $A = \{1, 2, 3, 4\}$. Give an example of a nonempty relation on A which is:

   (a) Symmetric and reflexive but not transitive.

   (b) Transitive but neither symmetric nor reflexive.

4. Define a relation R on $\mathbb{Z}$ by $R = \{(x, y) \mid |x - y| \geq 1\}$. Show that R is symmetric but is neither reflexive nor transitive.

5. Define a relation R on $\mathbb{Z}$ by $R = \{(x, y) \mid 4|(x - y)\}$. Which properties (reflextive, symmetric, transitive) does R have? Provide proofs.

6. Suppose A is the set of all students in this class and we define a relation R on A by sRt if students s and t have a birthday in the same month. Let x be you. Find the set $\{y \in A \mid xRy\}$.