Example questions

For each of the three relations defined below:
- Draw a graph (circles and arrows) corresponding to the relation
- Say whether the relation is:
  + reflexive, irreflexive, neither
  + symmetric, anti-symmetric, neither
  + transitive, not-transitive

Relation 1, $r_1$, on the set of people {Leon, Jill, Maria, Tim, Kate}

$r_1 = \{(Leon, Kate), (Kate, Leon), (Kate, Kate), (Maria, Jill), (Jill, Maria),
(Maria, Maria), (Tim, Leon), (Leon, Tim)\}$

Not reflexive, symmetric, not transitive

Relation 2, $r_2$, on the set of food {pizza, fries, hotdog, burger, soda}

$r_2 = \{(soda, soda), (soda, hotdog), (soda, pizza), (burger, fries), (fries, burger),
(fries, fries), (pizza, fries), (pizza, burger)\}$

Relation 3, $r_3$, on the set of numbers {1, 2, 3, 4, 5, 6, 7, 8}

$r_3 = \{(1, 1), (1,4), (1,8), (3, 3), (4, 4), (4,8), (5, 5), (5,8), (8, 8)\}$

Write out the set of ordered pairs in the following relations on the integers $\mathbb{Z}$:

- $(x,y)$ is in the relation if and only if $y > 3x$
- $(x,y)$ is in the relation if and only if $3x-y=4$
- $(x,y)$ is in the relation if and only if $\frac{x}{y}=5$
- $(x,y)$ is in the relation if and only if $x-3=2y$

\{-3,-3\}, \{-1,-2\}, \{1,-1\}, \{3,0\}, \{5,1\} ...

Consider the following relations on the set of all people and say whether the resulting relations are: reflexive, irreflexive, or neither; symmetric, anti-symmetric, or neither; transitive or not

- Has as many siblings as
  Reflexive, symmetric, transitive

- Is shorter than
  Reflexive, symmetric, transitive

- Has bought food at the same restaurant as
  Reflexive, symmetric, transitive

- Took the same Spring 2014 classes as
  Reflexive, symmetric, transitive