Your TA may or may not give you specific advice or directions on which questions to try first.

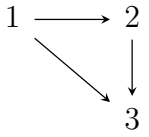
Exercise 1.
For each of the following relations R, determine whether it is an equivalence relation, and interpret it using digraphs.

(a) R is a relation on $\mathbb{Z}$ such that $xRy \iff x - y$ is a multiple of 3.

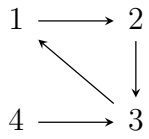
(b) R is a relation on $[5] := \{0, 1, 2, 3, 4\}$ such that $xRy \iff x + y \equiv 0 \mod 5$.

Exercise 2.
For each of the following digraphs, computes its transitive closure.

(a) $G =$



(b) $H =$



Exercise 3.
Suppose $\sim$ is an equivalence relation on a set A, how would its digraph look like? How would you use a digraph to represent the set of equivalence classes $A/\sim$ with the induced relation?

Exercise 4.
Let A denote the set of integers from 2 to 20. We define a relation $\preccurlyeq$ on A with $a \preccurlyeq b \iff a \mid b$. Show that $\preccurlyeq$ defines a partial order, and draw the Hesse diagram for it.

Exercise 5.
Write a pseudo-code for each algorithm

(a) compute the sum of absolute value of a sequence of real numbers $\{a_i\}_{i=1}^n$.

(b) sort a sequence $\{a_i\}_{i=1}^n$ of distinct real numbers in ascending order.