Question 1: **10 Marks**

You are given as input a 0-1 matrix M[n][n] representing a relation R on a set. Write a code fragment to determine whether or not the relation R is Transitive.

Question 2: **10 Marks**

You are given as input a 0-1 matrix M[n][n] representing a relation R on a set. Write a code fragment to compute the Transitive Closure of R.

Question 3: **10 Marks**

You are given as input two 2-dimsntional arrays representing two n-ary relations of degree 10 and 8 respectively (you may assume number of tuples/records in each table by yourself). Write a code fragment to compute J_5 on the input tables.

Question 4: **10 Marks**

Let *A* be the set of students at your school and *B* the set of books in the school library. Let *R*1 and *R*2 be the relations consisting of all ordered pairs *(a, b)*, where student *a* is required to read book *b* in a course, and where student *a* has read book *b*, respectively. Describe the ordered pairs in each of these relations.

> **a)** $R1 \cup R2$ **b)** $R1 \cap R2$
>
> **c)** $R1 \oplus R2$ **d)** $R1 - R2$
>
> **e)** $R2 - R1$

Question 5: **10 Marks**

Let *R* be the relation on the set of people consisting of pairs (*a, b*), where *a* is a parent of *b*. Let *S* be the relation on the set of people consisting of pairs (*a, b*), where *a* and *b* are siblings (brothers or sisters). What are $S \circ R$ and $R \circ S$?

Due Date: October 23 (At the start of your respective class)

You may work in groups of 2-3 students; One submission is sufficient for the whole group
Only **Handwritten** Submissions would be considered for grading!!!