

CS2022/MA2201
HW#7

DUE: Thursday, October 11

1. (4 points) Prove or give a counterexample to the following:

CONJECTURE: For any set A and any binary relations R and S on A , if R and S are reflexive, then so is $R \cup S$.

2. (4 points) Prove or give a counterexample to the following:

CONJECTURE: For any set A and any binary relations R and S on A , if R is reflexive, then so is $R \cup S$.

3. (4 points) Prove or give a counterexample to the following:

CONJECTURE: For any set A and any binary relations R and S on A , if R and S are transitive, then so is $R \cup S$.

4. (4 points) Prove or give a counterexample to the following:

CONJECTURE: For any set A and any binary relation R on A , if R is reflexive and symmetric, then it must be transitive.

5. (1 point) Do **EXERCISE 6.4.2** of our text.

6. (4 points) Find the transitive closure of each of the following relations:

$$a \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$$

$$b \begin{bmatrix} 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}$$