

7. Let $A = \{3, 4, 5\}$ and $B = \{4, 5, 6\}$ and let \mathcal{R} be the less than relation on $A \times B$, i.e.:

$$\forall (a, b) \in A \times B : a \mathcal{R} b \text{ if and only if } a < b.$$

State explicitly which pairs from $A \times B$ are in \mathcal{R} and \mathcal{R}^{-1} .

8. Let A be the set of all strings consisting solely of a 's and b 's of length 4. Define the relation \mathcal{F} on A by

$$\forall s, t \in A : s \mathcal{F} t \text{ if and only if } s \text{ and } t \text{ have the same first two letters}$$

Is \mathcal{F} reflexive, symmetric, and transitive? (Justify your answers.)

9. Define a relation P on the set $\mathbb{R} \times \mathbb{R}$ as follows:

$$\forall (w, x), (y, z) \in \mathbb{R} \times \mathbb{R} : (w, x)P(y, z) \text{ if and only if } w = y.$$

Show that P is an equivalence relation and describe the equivalence classes formed by P .

Challenge Problems:

(listed by section and problem number) You don't need to write these up. Two of these will be on the exam and will count for 20% of the exam grade.

§ 6.1: 30, 33

§ 7.2: 56, 58

§ 8.3: 44,47

Additional Practice Problems:

(listed by section and problem number)

§ 6.1: 3ab, 5, 11, 19, 28, 31

§ 7.1: 1, 6a, 7ac, 15, 17ac, 18ac, 19, 23, 33

§ 7.2: 6, 7a, 10, 14, 15, 16, 21

§ 7.3: 1, 3, 9a, 24

§ 8.1: 2, 10, 21

§ 8.2: 9, 12, 15, 25, 34

§ 8.3: 1, 5, 8, 21, 29