Discrete Math 2 HW 2

Ben Awad

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Problem 9.5.22.

It is an equivalence relation

Problem 9.5.24. a-c

a. No b. Yes c. Yes

Problem 9.5.16.

Reflexive proof:
1. Let a,d be positive integers
2. ad=da
3. ad=ad (commutative)

Symmetric proof:
1. Assume (a,b) related to (c,d) and a,b,c,d are positive integers
2. ad=bc (definition for relation)
3. cb=ad (algebra)

Transitive proof:
1. Assume (a,b) related to (c,d) and (c,d) related to (e, f) and a,b,c,d,e,f are positive integers
2. ad=bc (definition of relation)
3. cf=de (definition of relation)
4. $\frac{a}{b} = \frac{c}{d}$
5. $\frac{c}{d} = \frac{e}{f}$
6. $\frac{a}{b} = \frac{e}{f}$
7. af=be (algebra)

Problem 9.5.40.

a. $\{c, d \in \mathbb{Z}^+ | d = 2c\}$

Problem Let R and S be relations on the set....

a. {(a, b),(b, d),(c, b),(d, e),(d, f),(a, a),(b, b),(c, c),(d, d),(e, e),(f, f)}
b. {(a, b),(b, d),(c, b),(d, e),(d, f),(b, a),(d, b),(b, c),(e, d),(f,d)}
c. {(a, b),(b, d),(c, b),(d, e),(d, f),(b, f),(b, e),(c, d),(c, e),(c, f),(a, d),(a, f),(a, e)}
d. {(b, a),(b, c),(d, b),(d, d),(e, b),(f, d),(b, b),(a, a),(c, c),(e, e),(f, f)}
e. {(b, a),(b, c),(d, b),(d, d),(e, b),(f, d),(a, b),(b, e),(c, b),(b, d),(d, f)}
f. {(b, a),(b, c),(d, b),(d, d),(e, b),(f, d),(d, a),(e, a),(e, c),(d, c),(f, c),(f, b),(f, a)}

R is not a partial order on set A because it is not reflexive because (a, a) is not in R. Therefore the first part of the implication is always false, so the whole thing is true.