9.1 Relations and Their Properties

9.1 pg. 581 # 3

For each of these relations on the set $\{1, 2, 3, 4\}$, decide whether it is reflexive, whether it is symmetric, whether it is antisymmetric, and whether it is transitive.

a $\{(2, 2), (2, 3), (2, 4), (3, 2), (3, 3), (3, 4)\}$

b $\{(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (4, 4)\}$

c $\{(2, 4), (4, 2)\}$

d $\{(1, 2), (2, 3), (3, 4)\}$

e $\{(1, 1), (2, 2), (3, 3), (4, 4)\}$

f $\{(1, 3), (1, 4), (2, 3), (2, 4), (3, 1), (3, 4)\}$

9.1 pg. 581 # 7

Determine whether the relation R on the set of all integers is reflexive, symmetric, antisymmetric, and/or transitive, where $(x, y) \in R$ if and only if

a $x \neq y$.

b $xy \geq 1$.

c $x = y + 1$ or $x = y - 1$.

g $x = y^2$.

h $x \geq y^2$.

9.1 pg. 582 # 27

Let R be the relation $R = \{(a, b)|a \mid b\}$ on the set of positive integers. Find

a R^{-1}

b $\overline{R}$