

(1)

$$x-y \text{ rational } x, y \in \mathbb{R}$$

$$x \in \mathbb{R} \quad x-x=0 \quad (x, x) \in R$$

R is Reflexive

$$(x, y) \in R$$

$x-y$ and $y-x$ both rational so
 R is symmetric

$$(x, y) \in R \implies (3, 4) \in R$$

$$3-4 = \text{rational} \quad 4-3 = \text{rational}$$

$-1 \neq 1$. Not antisymmetric

$$(x, y) \in R \quad (y, z) \in R$$

$x-y$ and $y-z$ both Rational so
 $x-z = x-y + y-z$

D.O $x=2y$ Let $a=1$ at $2a$ as $2 \neq 4$ a ~~is~~

R is Not Reflexive,

② Let a, b be real nonzero numbers so $a=2b$ and $b \neq \frac{1}{2}a$
 $b \neq \frac{1}{2}a$ so $a \neq b$ but $b \in R$ so Not symmetric

③ Let a, b be 0 then $a=b$
 $a \neq b$ $b \in R$ so antisymmetric

~~④~~

④ a, b, c are real numbers ~~$a = b$~~

$a = 2b$ $b = 2c$ so $a R b$ and $b R c$ so $a R c$

$$\frac{1}{2}a = b$$

$$\frac{1}{2}a = 2c$$

$$a = 4c$$

$$4c \neq 2c$$

so $a \not R c$

R is Not transitive