$\boxed{4}$ $\boxed{a}$ show that if $f(x)$ is even and $g(x)$ is odd then $(g \circ f)(x)$ is even

$f(x)$ is even $\Rightarrow f(-x) = f(x) \quad \forall x$

$g(x)$ is odd $\Rightarrow g(-x) = -g(x) \quad \forall x$

$$(g \circ f)(-x) = g\big(f(-x)\big) = g\big(f(x)\big) \quad \text{since } f \text{ is even}$$

$$= (g \circ f)(x)$$

$\boxed{b}$ show that if $f(x)$ is even and $g(x)$ is odd then $\frac{f(x)}{g(x)}$ is odd

$$\frac{f(x)}{g(x)} = \left(\frac{f}{g}\right)(x)$$

$$\left(\frac{f}{g}\right)(-x) = \frac{f(-x)}{g(-x)}$$

$$= \frac{f(x)}{-g(x)} \quad \text{since } f \text{ even and } g \text{ odd}$$

$$= -\frac{f(x)}{g(x)}$$

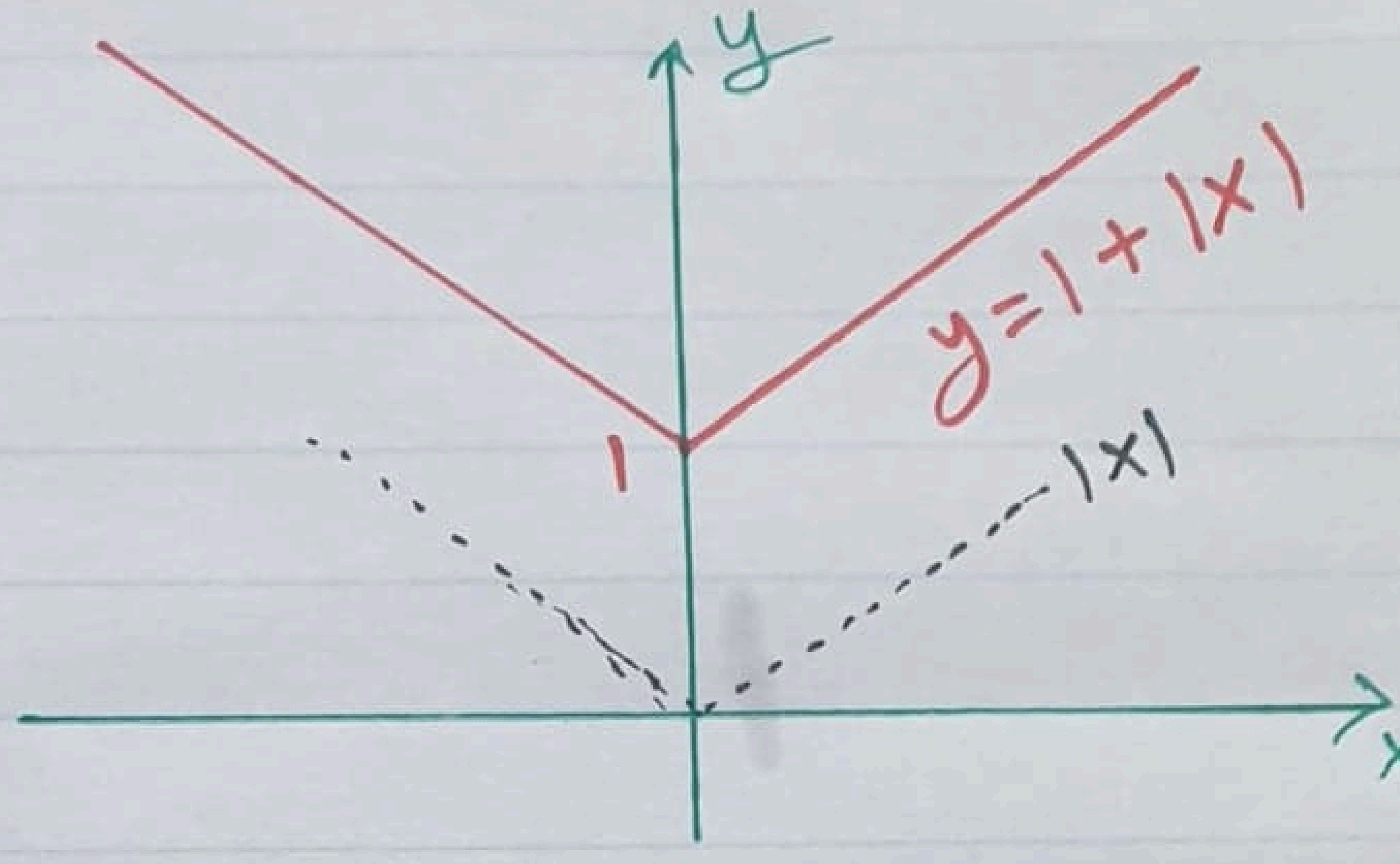
$$= -\left(\frac{f}{g}\right)(x)$$

Note:
- Even Functions are symmetric about y-axis
- Odd functions are symmetric about origin $(0,0)$

$\boxed{1}$ $\boxed{c}$ Find D and R of $f(x) = 1 + |x|$

$D = \mathbb{R} = (-\infty, \infty)$

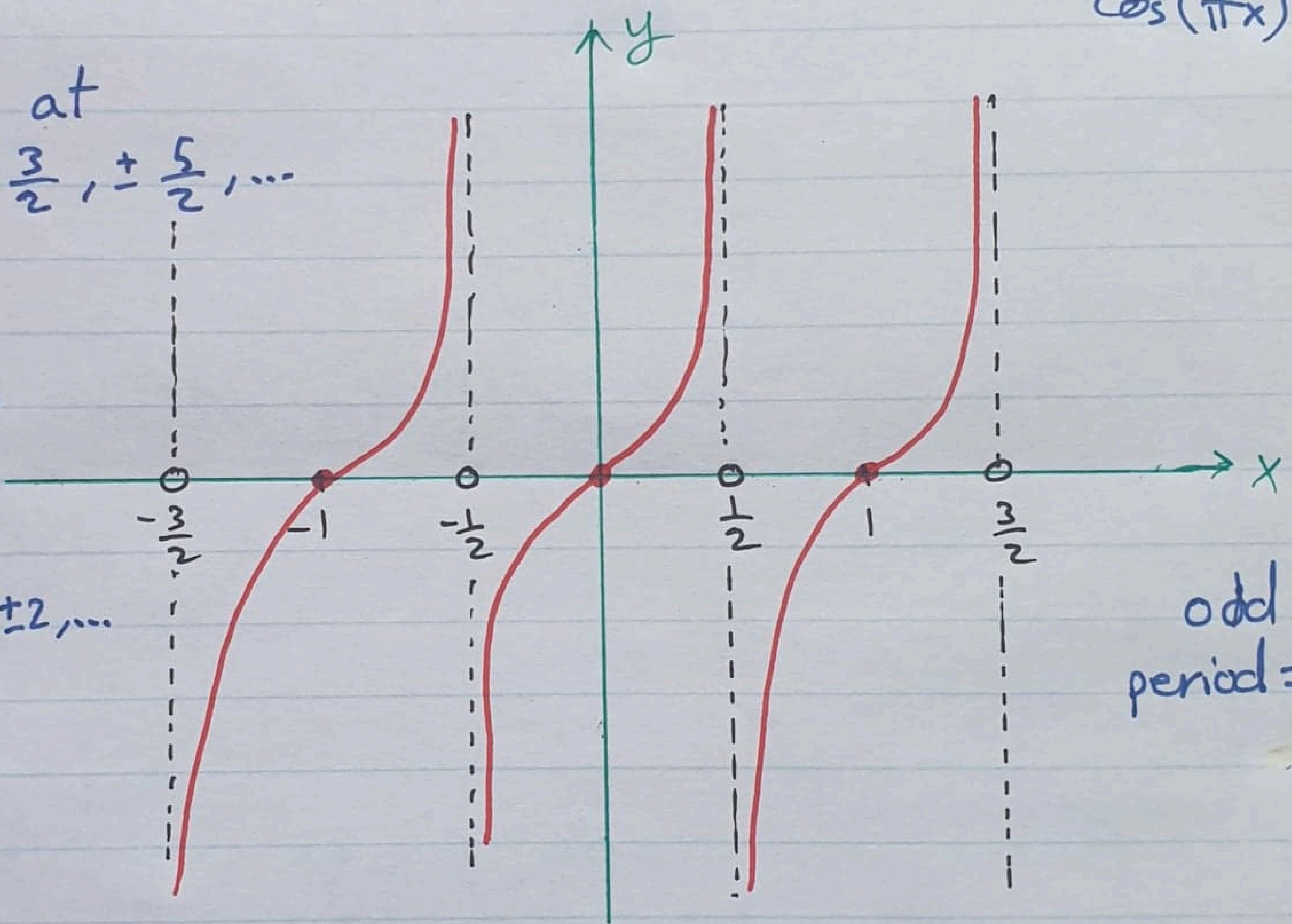
$R = [1, \infty)$



$\boxed{1}$ $\boxed{b}$ Find D and R of $f(x) = \tan(\pi x) = \dfrac{\sin(\pi x)}{\cos(\pi x)}$

- $\cos(\pi x) = 0$ at $x = \pm\frac{1}{2}, \pm\frac{3}{2}, \pm\frac{5}{2}, \dots$

- $\tan(\pi x) = 0$ when $\sin(\pi x) = 0$ at $x = 0, \pm 1, \pm 2, \dots$



odd

period = 1

Domain $= \mathbb{R} \setminus \{\pm\frac{1}{2}, \pm\frac{3}{2}, \pm\frac{5}{2}, \dots\}$

$R = \mathbb{R}$