Ch1 – Discussion

1) Find D and R :

a) $f(x) = \frac{1}{\sqrt{x}}$ D: $x > 0 \Rightarrow D = (0, \infty)$

$R = (0, \infty)$

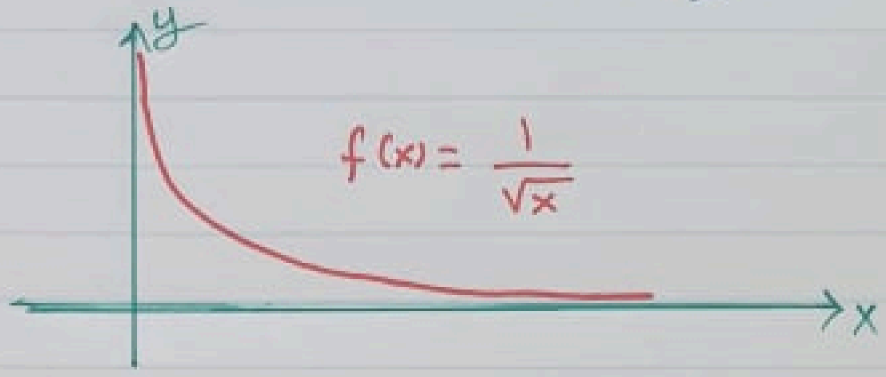
$x = 1 \Rightarrow f(1) = 1 \in R$

$x = \frac{1}{4} \Rightarrow f(\frac{1}{4}) = 2 \in R$, $x = 4 \Rightarrow f(4) = \frac{1}{2} \in R$

$x = \frac{1}{16} \Rightarrow f(\frac{1}{16}) = 4 \in R$, $x = 16 \Rightarrow f(16) = \frac{1}{4} \in R$

$x = 25 \Rightarrow f(25) = \frac{1}{5} \in R$

$\vdots \quad \vdots$



e) $g(x) = \frac{1}{x^2}$ $D = \mathbb{R} \setminus \{0\} = (-\infty, 0) \cup (0, \infty)$

$x^2 \neq 0$

$x \neq 0$

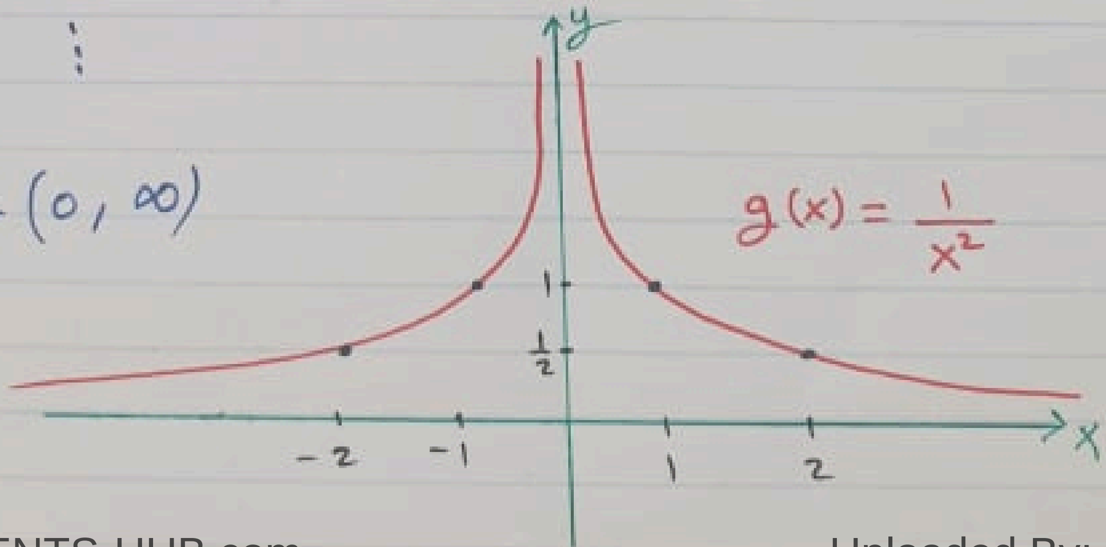
$x = \pm 2 \Rightarrow g(\pm 2) = \frac{1}{4} \in R$

$x = \pm 1 \Rightarrow g(\pm 1) = 1 \in R$

$x = \pm \frac{1}{2} \Rightarrow g(\pm \frac{1}{2}) = 4 \in R$

$\vdots$

$R = (0, \infty)$



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f) $h(x) = \frac{1}{\sqrt{1-x^2}}$

To find D $\Rightarrow$

$1 - x^2 > 0$

$1 > x^2$

$\sqrt{1} > \sqrt{x^2}$

$1 > |x|$

$|x| < 1$

$-1 < x < 1 \Rightarrow D = (-1, 1)$

To find R $\Rightarrow$

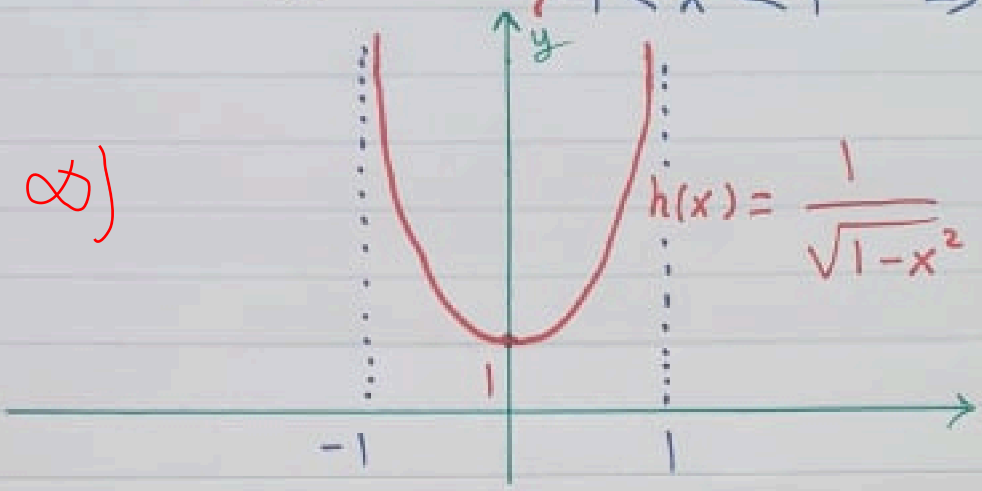
$x = 0 \Rightarrow f(0) = 1 \in R$

$x = \pm \frac{1}{2} \Rightarrow f(\pm \frac{1}{2}) = \frac{1}{\frac{\sqrt{3}}{2}} = \frac{2}{\sqrt{3}} \in R$

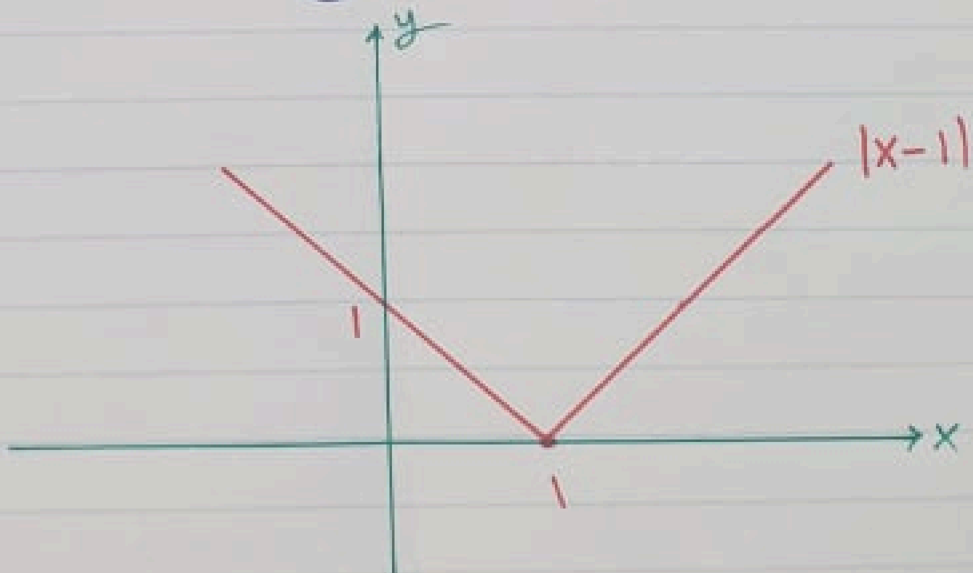
$x = \pm \frac{1}{4} \Rightarrow f(\pm \frac{1}{4}) = \frac{4}{\sqrt{15}} \in R$

$\vdots$

$R = [1, \infty)$



2 b) $y = |x-1|$ same graph of $|x|$ but shift to the right by one unit



3) a) $f(x) = x^2 + 1$ is even since

$$f(-x) = (-x)^2 + 1$$
$$= x^2 + 1$$
$$= f(x)$$

b) $f(x) = x^3 + x$ is odd since

$$f(-x) = (-x)^3 + (-x)$$
$$= -x^3 - x$$
$$= -(x^3 + x)$$
$$= -f(x)$$

c) $g(t) = \frac{1}{t-1}$ is neither even nor odd since

$$g(-t) = \frac{1}{(-t)-1}$$
$$= \frac{1}{-t-1} = -\frac{1}{(t+1)}$$

d) $h(x) = \frac{x}{x^2-1}$ is odd since

$$h(-x) = \frac{(-x)}{(-x)^2 - 1}$$

$$= -\frac{x}{x^2-1}$$

$$= -h(x)$$