

Question 1

A relation is a function, if and only if, the x -values do not repeat

a) $f \{ (2, 1), (3, 2), (2, 2), (4, 7) \}$

It is not a function. The value of x repeats itself

b) $g \{ (1, 2), (2, 1), (2, -1), (3, 4), (6, 5) \}$

Not a function. value of x repeat itself.

c) $h \{ (1, 1), (2, 2), (7, 3), (5, 4) \}$

It is a function. The values of x do not repeat.

Question 2

$$2) g(1, 2) \cdot (6, 5)$$

$$h(1, 1) \cdot (5, 6)$$

∴

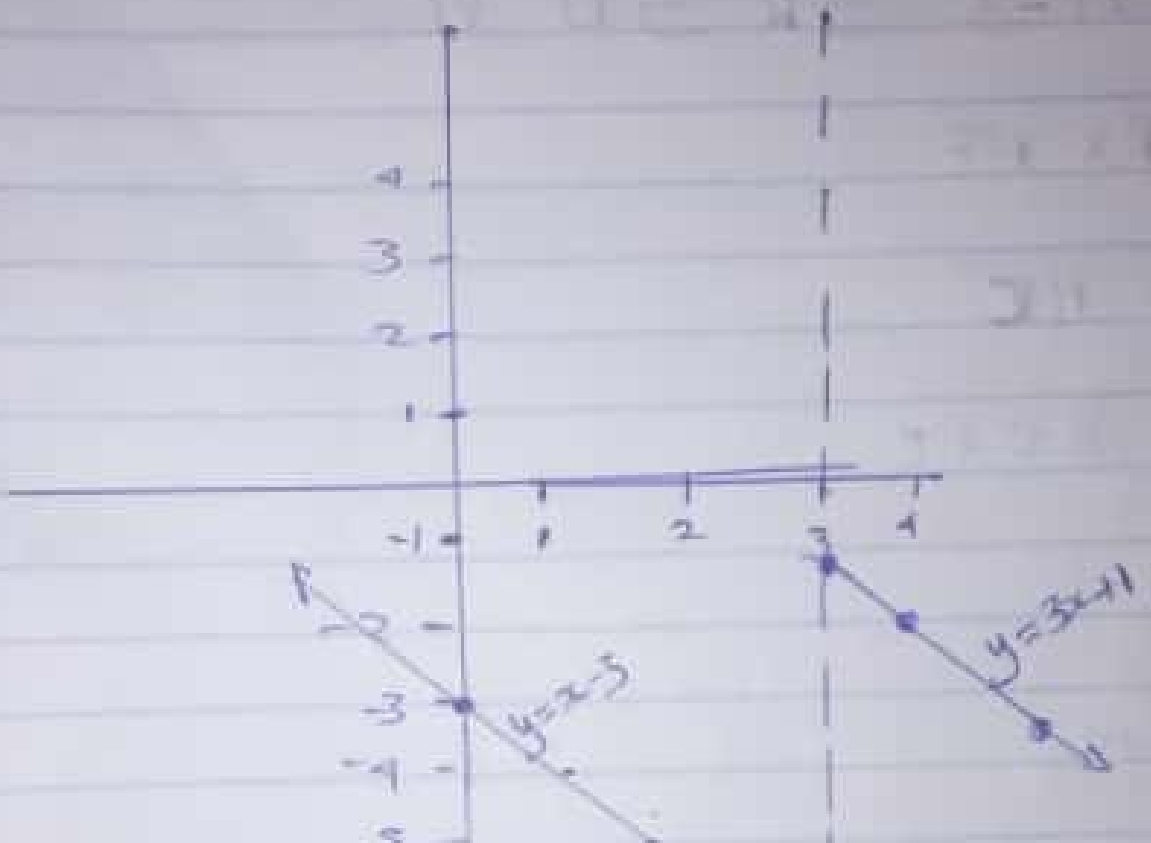
$$g) \text{ gradient} = \frac{5-2}{6-1} = \frac{3}{5}$$

$$h) \text{ gradient} = \frac{6-1}{5-1} = \frac{5}{4}$$

eq.

$$g(h(x)) = 3\left(\frac{5}{4}x\right) - \frac{1}{4}$$

3)



4)
a) $3f(x-2) - 3$ SR SD VE.

b SR RX HE

c SI SU HE

d SI, SD, RX HE

$$5) f(x) = \frac{7-x}{4}$$

a)

$$y = \frac{7-x}{4}$$

$$x = \frac{7-y}{4}$$

$$4x = 7-y$$

$$\frac{-y}{-1} = \frac{4x-7}{-1}$$

$$y = 7-4x$$

$$b) f(x) = \frac{2x+1}{x-3}$$

$$y = \frac{2x+1}{x-3}$$

$$x = \frac{2y+1}{y-3}$$

$$x(y-3) = 2y+1$$

$$xy-3x = 2y+1$$

$$xy-2y = 3x+1$$

$$y(x-2) = 3x+1$$

$$y = \frac{3x+1}{x-2}$$

$$6) f(h(2)) = 2((\sqrt{x}-1)^2) + \sqrt{x+1}$$

$$= 2x-2 + \sqrt{x+1}$$

$$= 2(2)-2 + \sqrt{2+1}$$

$$= 2 + \sqrt{1}$$

$$= 3$$

$$h) f(2x) = (g(x))^2 =$$

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

$$= 4x^2$$

$$= 8x^2 + 2x$$

$$(g(x))^2 = (3x-7)^2 = 9x^2 - 42x + 49$$

$$8x^2 + 2x - (9x^2 - 42x + 49)$$

$$8x^2 - 9x^2 + 2x + 42x - 49$$

$$= -17x^2 + 44x - 49$$

$$\begin{aligned}
 &= 2x - 2 + \sqrt{x-1} \\
 &= 2(x-2) + \sqrt{2-1} \\
 &= 2 + \sqrt{1} \\
 &= 3
 \end{aligned}$$

$$b) f(2x) = (g(x))^2 =$$

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

$$= 8x^2$$

$$= 8x^2 + 2x$$

$$(g(x))^2 = (5x-7)^2 = 25x^2 + 70x - 49$$

$$\begin{aligned}
 &8x^2 + 2x - (25x^2 + 70x - 49) \\
 &= 8x^2 - 25x^2 + 2x - 70x + 49 \\
 &= -17x^2 - 68x + 49
 \end{aligned}$$

$$7) f(x) = x^2 + 2$$

$$\begin{aligned} f(-x) &= (-x)^2 + 2 \\ &= x^2 + 2 \quad \text{even} \end{aligned}$$

$$f(x) = \frac{3}{x-5}$$

$$f(-x) = \frac{3}{-x-5} \quad \text{is odd}$$

$$f(x) = x^3 + 4x$$

$$\begin{aligned} f(-x) &= (-x)^3 + 4(-x) \\ &= -x^3 - 4x \quad \text{is odd} \end{aligned}$$

8)

Vertex

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

$$f(1) = -(1)^2 + 2(1) + 3 \\ = 4$$

#

(1, 4)

9) ~~2~~ real zeros

$$3x^2 + 1x + 3$$

$$f(1) = 4$$

$$f(3) = -(3)^2 + 2(3) + 3 \\ = 0$$

q).

$$f(x) = 8x^2 + 0x - 8$$

when ~~at~~

$a > 0$ we get a minimum point

$$x = \frac{-b}{2a} = \frac{-0}{16} = 0$$

$$f(0) = -8$$

$$(0, -8)$$

H is a