

$$24) g(x) = 4x - x^2$$

$$g(3) = 4(3) - (3)^2 = 12 - 9 = \underline{\underline{3}}$$

$$g(-1) = 4(-1) - (-1)^2 = -4 - 1 = \underline{\underline{-5}}$$

$$g(x) = 4(x) - (x)^2 = \underline{\underline{4x - x^2}}$$

$$g(x-2) = 4(x-2) - (x-2)^2 = 4x - 8 - (x^2 - 4x + 4) \\ = 4x - 8 - x^2 + 4x - 4 = \underline{\underline{-x^2 + 8x - 12}}$$

$$g(x+h) = 4(x+h) - (x+h)^2 = 4x + 4h - (x^2 + 2xh + h^2) \\ = \underline{\underline{4x + 4h - x^2 - 2xh - h^2}}$$

$$26) f(x) = 2x^2 - x$$

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

$$= 2(x^2 + 2xh + h^2) - x - h$$

$$= 2x^2 + 4xh + 2h^2 - x - h$$

$$\frac{f(x+h) - f(x)}{h} = \frac{(2x^2 + 4xh + 2h^2 - x - h) - (2x^2 - x)}{h} = \frac{4xh + 2h^2 - h}{h}$$

$$= \frac{h(4x + 2h - 1)}{h} = \underline{\underline{4x + 2h - 1}}$$

$$28) f(x) = x^3 \quad f(a) = (a)^3 = a^3$$

$$f(a+h) = (a+h)^3 = (a+h)(a+h)^2 = (a+h)(a^2 + 2ah + h^2)$$

$$= a^3 + 2a^2h + ah^2 + a^2h + 2ah^2 + h^3 = a^3 + 3a^2h + 3ah^2 + h^3$$

$$\frac{f(a+h) - f(a)}{h} = \frac{(a^3 + 3a^2h + 3ah^2 + h^3) - (a^3)}{h} = \frac{3a^2h + 3ah^2 + h^3}{h}$$

$$= \frac{h(3a^2 + 3ah + h^2)}{h} = \underline{\underline{3a^2 + 3ah + h^2}}$$

$$30) f(x) = \frac{x+3}{x+1} \quad f(1) = \frac{(1)+3}{(1)+1} = \frac{4}{2} = 2$$

GLCD = x+1

$$\begin{aligned} \frac{f(x) - f(1)}{x-1} &= \frac{\left(\frac{x+3}{x+1}\right) - (2)}{x-1} = \left(\frac{\frac{x+3}{x+1} - \frac{2}{1}}{x-1}\right) \left(\frac{x+1}{1}\right) \\ &= \frac{(x+3) - 2(x+1)}{(x-1)(x+1)} = \frac{x+3-2x-2}{(x-1)(x+1)} = \frac{-x+1}{(x-1)(x+1)} \\ &= \frac{-1(x-1)}{(x-1)(x+1)} = \frac{-1}{x+1} \end{aligned}$$

$$32) f(x) = \frac{3x+4}{x^2-x} \quad \text{"we can't have 0 in denominator"}$$

$$x^2 - x = 0$$

$$x(x-1) = 0$$

$$x=0 \quad | \quad x-1=0$$

$$x=1$$

domain: $(-\infty, 0) \cup (0, 1) \cup (1, \infty)$

$$34) g(u) = \sqrt{u-4} + 1.5u$$

even root "no restriction"

"we can only evaluate non negative numbers of even root in real numbers"

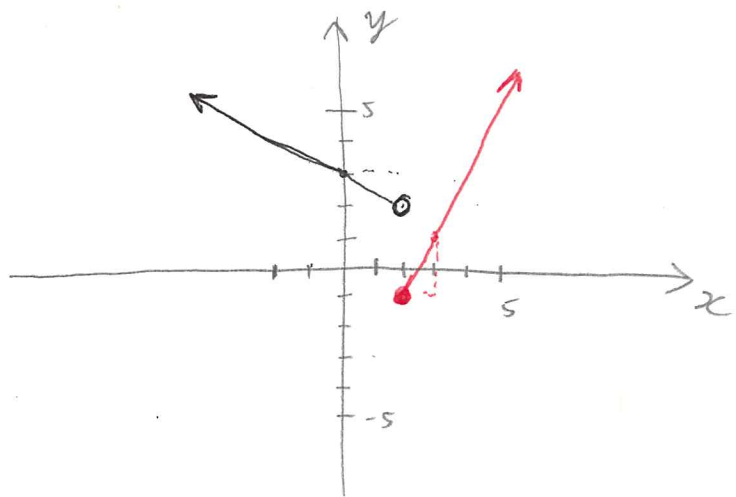
$$u-4 \geq 0$$

$$u \geq 4$$

$$4 \leq u$$

domain: $[4, \infty)$

$$42) f(x) = \begin{cases} 3 - \frac{1}{2}x & \text{if } x < 2 \\ 2x - 5 & \text{if } x \geq 2 \end{cases}$$



$$44) f(x) = \begin{cases} -1 & \text{if } x \leq 1 \\ 7 - 2x & \text{if } x > 1 \end{cases}$$

