

Omit Section 3.1 #69, 71, 75

Quiz tomorrow 2.2

Test Thurs 31st

1.1, 1.2, 1.4, 1.5, 2.1-4, 11.3, 3.1-4

1) Do Sugg HW

2) Practice Problems www.leahhoward.com

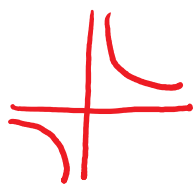
NO FORMULAS PROVIDED

BRING YOUR CALCULATOR

3.1 Cont'd

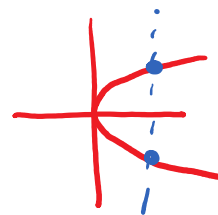
Recall Vertical Line Test

Ex: $y = \frac{1}{x}$



FUNCTION ✓

Ex: $x = y^2$



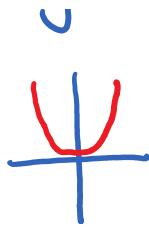
NOT A FUNCTION

Recall Domain: set of x-values

Range: " y-values

Ex: $y = x^2$

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domain: $-\infty < x < \infty$

range: $y \geq 0$

Restrictions on Domain :

- 1) Can't divide by 0
- 2) Can't take $\sqrt{x}$, $\sqrt[4]{x}$, $\sqrt[6]{x}$... of a negative #

Ex: Find the domain

a) $y = \frac{x}{x^2 - 9}$

$$x^2 - 9 \neq 0$$

$$x^2 \neq 9$$

$$x \neq \pm 3$$

$$\{x \mid x \neq \pm 3\}$$

b) $y = \sqrt[3]{x}$

all real #

$$-\infty < x < \infty$$

c) $y = \sqrt{x+2}$

$$x+2 \geq 0$$

$$x \geq -2$$

$$[-2, \infty)$$

$$d) \quad y = \frac{1}{\sqrt{x+2}}$$

$$x+2 \neq 0 \quad \text{and} \quad x+2 \geq 0$$

$$x+2 > 0$$

$$x > -2$$

$$e) \quad y = \sqrt{x} + \frac{1}{x-5}$$

$$x \geq 0 \quad \text{and} \quad \begin{matrix} x-5 \neq 0 \\ x \neq 5 \end{matrix}$$

$$\{x \mid x \geq 0 \text{ and } x \neq 5\}$$

Ex: Given $f(x) = x^2$. Find:

$$\begin{aligned} a) \quad f(2) \\ &= 2^2 \\ &= 4 \end{aligned}$$

$$\begin{aligned} b) \quad f(-2) \\ &= (-2)^2 \\ &= 4 \end{aligned}$$

$$\begin{aligned} c) \quad -f(2) \\ &= -2^2 \\ &= -4 \end{aligned}$$

$$\begin{aligned} d) \quad f(x) + f(2) \\ &= x^2 + 4 \end{aligned}$$

$$\begin{aligned} \text{e) } 2f(x) \\ = 2x^2 \end{aligned}$$

$$\begin{aligned} \text{f) } f(2x) \\ = (2x)^2 \\ = 4x^2 \end{aligned}$$

$$\begin{aligned} \text{g) } f(x+1) \\ = (x+1)^2 \\ = x^2 + 2x + 1 \end{aligned}$$

$$\begin{aligned} \text{h) } f(x+h) \\ = (x+h)^2 \\ = x^2 + 2xh + h^2 \end{aligned}$$

$$\begin{aligned} &\text{Difference Quotient} \\ &\frac{f(x+h) - f(x)}{h} \end{aligned}$$

Don't
memorize

Ex: Simplify $\frac{f(x+h) - f(x)}{h}$

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

$$\begin{aligned} \frac{f(x+h) - f(x)}{h} &= \frac{(x+h)^2 - x^2}{h} \quad \leftarrow \\ &= \frac{\cancel{x^2} + 2xh + h^2 - \cancel{x^2}}{h} \end{aligned}$$

$$= \frac{\cancel{h}(2x+h)}{\cancel{h}}$$

$$= 2x+h$$

$$b) f(x) = \frac{1}{x}$$

$$\frac{f(x+h) - f(x)}{h} = \frac{\frac{1}{x+h} - \frac{1}{x}}{h}$$

$$= \frac{1}{h} \left[\underbrace{\frac{1}{x+h} - \frac{1}{x}}_{\text{Common Denominator}} \right]$$

$$= \frac{1}{h} \left[\frac{x}{(x+h)x} - \frac{x+h}{(x+h)x} \right]$$

$$= \frac{1}{h} \left[\frac{x - (x+h)}{(x+h)x} \right] \leftarrow$$

$$= \frac{1}{h} \cdot \frac{\cancel{x} - x - h}{(x+h)x}$$

$$= \frac{-h}{h(x+h)x}$$

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

c) $f(x) = \sqrt{x-1}$

(Conjugate Radical)

$$\frac{f(x+h) - f(x)}{h} = \frac{(\sqrt{x+h-1} - \sqrt{x-1})}{h} \cdot \frac{(\sqrt{x+h-1} + \sqrt{x-1})}{(\sqrt{x+h-1} + \sqrt{x-1})}$$

$$= \frac{x+h-1 + \cancel{\sqrt{x+h-1}\sqrt{x-1}} - \cancel{\sqrt{x-1}\sqrt{x+h-1}} - (x-1)}{h(\sqrt{x+h-1} + \sqrt{x-1})}$$

⋮