Today's Learning Goal(s):
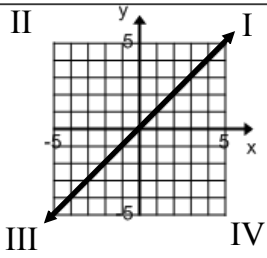
By the end of the class, I will be able to:

a) quickly graph the 5 parent functions.

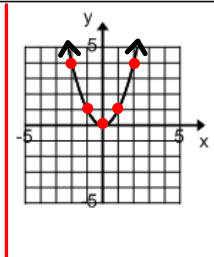b) state the domain and range of a function from the graph, table or equation.

1.3 Parent Functions
1.4 Domain & Range (revisited)

Date: Feb.23/18

(**Every** lesson)

Equation of Function	Name of Function	Sketch of Graph	Special Features/ Symmetry	Domain	Range
$f(x) = x$	Linear	II / I / III / IV	· Straight line · Goes through origin · In QI and QIII	$\{x \in \mathbb{R}\}$	$\{y \in \mathbb{R}\}$
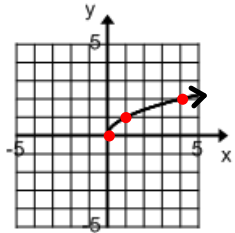
Equation of Function	Name of Function	Sketch of Graph	Special Features/ Symmetry	Domain	Range
$f(x) = x^2$	Quadratic		· Parabola opening up · Vertex at origin · y-axis is A. of S. · In QI and QII	$\{x \in \mathbb{R}\}$	$\{y \in \mathbb{R} \mid y \geq 0\}$

Key Points: (0,0)

(1,1) (-1,1)

(2,4) (-2,4)

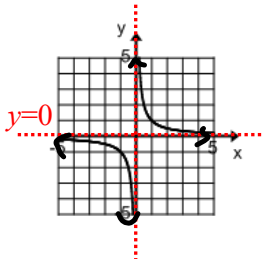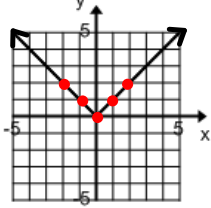| Equation of Function	Name of Function	Sketch of Graph	Special Features/ Symmetry	Domain	Range
$f(x) = \sqrt{x}$	Square Root		· Curve · Starts at origin · Only in QI	$\{x \in \mathbb{R} \mid x \geq 0\}$	$\{y \in \mathbb{R} \mid y \geq 0\}$

Key Points: (0,0)
(1,1)
(4,2)

Equation of Function	Name of Function	Sketch of Graph	Special Features/ Symmetry	Domain	Range
$f(x) = \dfrac{1}{x}$	Reciprocal	$y=0$	· Asymptotes at x-axis and y-axis · In QI and QIII · Curves toward but never crosses asymptotes	$\{x \in \mathbb{R} \mid x \neq 0\}$	$\{y \in \mathbb{R} \mid y \neq 0\}$

VA: $x=0$

VA = vertical asymptote

Key Points: (1,1)   (−1,−1)

$\left(2, \dfrac{1}{2}\right)$ $\left(-2, \dfrac{-1}{2}\right)$

HA = horizontal asymptote $\left(\dfrac{1}{2}, 2\right)$ $\left(\dfrac{-1}{2}, -2\right)$

Equation of Function	Name of Function	Sketch of Graph	Special Features/ Symmetry	Domain	Range
$f(x) = \lvert x \rvert$	Absolute Value		· V that opens up · Vertex at origin · y-axis is A. of S. · In QI and QII	$\{x \in \mathbb{R}\}$	$\{y \in \mathbb{R} \mid y \geq 0\}$

Key Points: (0,0)

$A \text{ of } S = Axis \text{ of } Symmetry$

(1,1)   (-1,1)

(2,2)   (-2,2)

$y = \lvert -3 \rvert \quad \begin{cases} y = \lvert 3-7 \rvert \\ = \lvert -4 \rvert \\ = 4 \end{cases}$
$y = 3$

$y = \lvert 2 \rvert$
$y = 2$

Assignment - hand in at the beginning of next class

On a full size sheet of graph paper, graph the following functions.
- Identify the key points for each function
- Use a scale of 1 box = 1 unit
- State the Domain and Range

$$y = \sqrt{x} \qquad\qquad y = \lvert x \rvert \qquad\qquad y = \frac{1}{x}$$

Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 22-23 #1, 2, 4 – 7, 9, 10

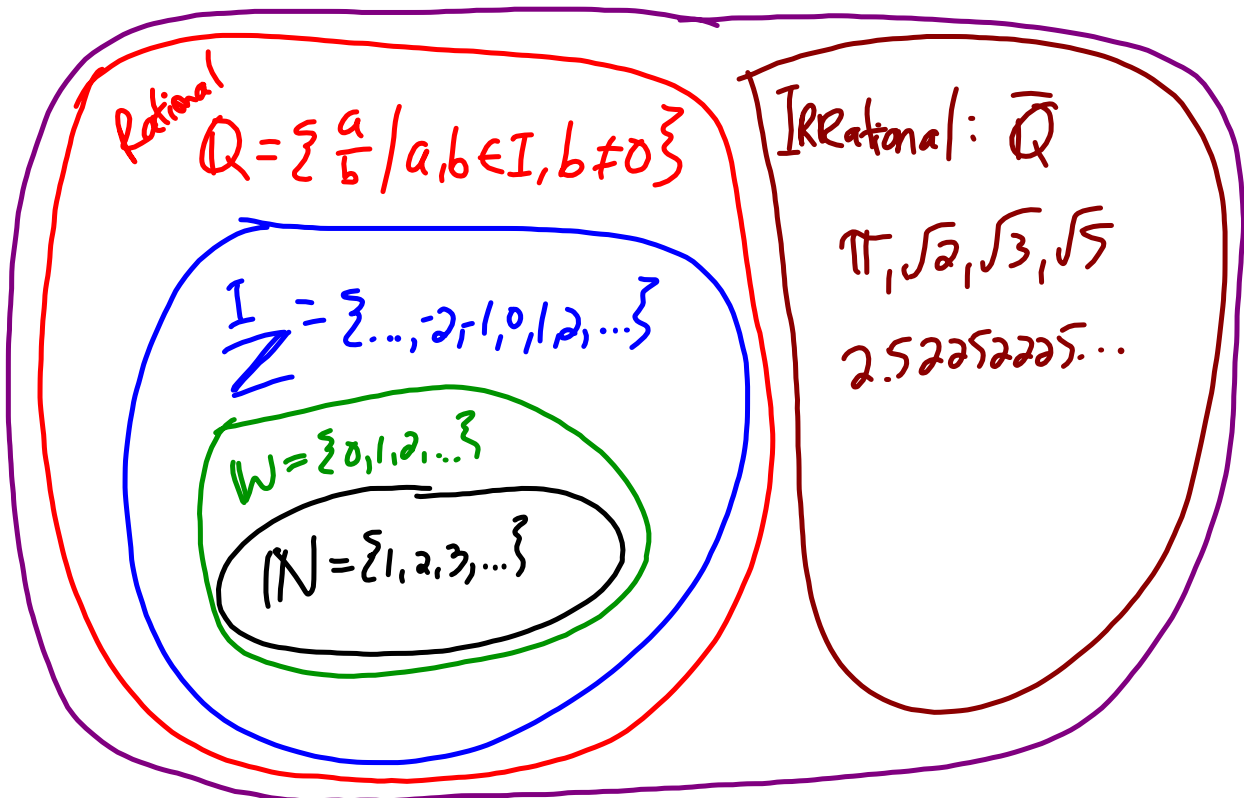Funcon Notaon Worksheet #1 – 6

(answer keys on class website)

Q

$2c \quad 5d \qquad 2_i$

Today's Homework Practice includes:

p. 28 #1 - 3

pp. 35-37 #4, 9, 11 [16, 17]

Number systems Venn Diagram

$$\text{Real} = Q \cup \overline{Q}$$

Rational

$$Q = \left\{ \frac{a}{b} \,\middle|\, a, b \in I, b \neq 0 \right\}$$

$$\frac{I}{Z} = \{\ldots, -2, -1, 0, 1, 2, \ldots\}$$

$$W = \{0, 1, 2, \ldots\}$$

$$\mathbb{N} = \{1, 2, 3, \ldots\}$$

Irrational: $\overline{Q}$

$$\pi, \sqrt{2}, \sqrt{3}, \sqrt{5}$$

$$2.5225222 5\ldots$$

p. 22 #2c

2. The graphs of $y = f(x)$ and $y = g(x)$ are shown.

Using the graphs, evaluate

a) $f(1)$
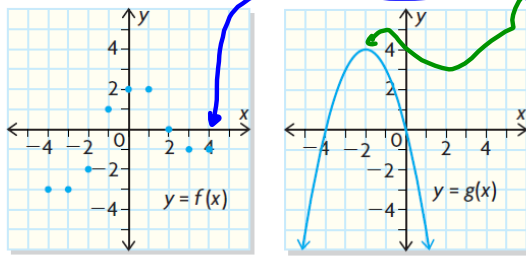
c) $f(4) - g(-2)$

From the graphs:

$f(4) = -1$ when $x = 4$, $y = -1$

$g(-2) = 4$ when $x = -2$, $y = 4$

$\therefore f(4) - g(-2)$

$= -1 - (4)$

$= -5$

p. 23 #5d

5. For $f(x) = \dfrac{1}{2x}$, determine

d) $f\left(\dfrac{1}{4}\right) + f\left(\dfrac{3}{4}\right)$

$= \dfrac{1}{2\left(\frac{1}{4}\right)} + \dfrac{1}{2\left(\frac{3}{4}\right)}$

$= \dfrac{1}{\frac{1}{2}} + \dfrac{1}{\frac{3}{2}}$

$= 2 + \dfrac{2}{3}$

$= \dfrac{6}{3} + \dfrac{2}{3}$

$= \dfrac{8}{3}$

p. 23 #9b

9. Consider the function $f(s) = s^2 - 6s + 9$.

a) Create a table of values for the function.

b) Determine each value.

i) $f(0)$ iv) $f(3)$

ii) $f(1)$ v) $[f(2) - f(1)] - [f(1) - f(0)]$

iii) $f(2)$ vi) $[f(3) - f(2)] - [f(2) - f(1)]$

i) $f(0) = (0)^2 - 6(0) + 9$

$= 9$

ii) $f(1) = (1)^2 - 6(1) + 9$

$= 1 - 6 + 9$

$= 4$

iii) $f(2) = (2)^2 - 6(2) + 9$

$= 4 - 12 + 9$

$= 1$

iv) $f(3) = (3)^2 - 6(3) + 9$

$= 9 - 18 + 9$

$= 0$

v) $[f(2) - f(1)] - [f(1) - f(0)]$

$= [1 - 4] - [4 - 9]$

$= (-3) - (-5)$

$= -3 + 5$

$= 2$

vi) $[f(3) - f(2)] - [f(2) - f(1)]$

$= [0 - 1] - [1 - 4]$

$= (-1) - (-3)$

$= -1 + 3$

$= 2$

Worksheet #2i

$h(x) = \dfrac{12}{x}$

i. Find x if $h(x) = -2$

$-2 = \dfrac{12}{x}$

$-2x = 12$

$x = -6$

Worksheet #6

6. Determine the maximum result if $f(x) = -3x^2 + 24x$ is a quadratic that opens down.

HINT: The maximum occurs halfway between the x-intercepts.

THINK: How do I find the intercepts? How do I find the max?

Challenge: Use function notation to find your answer.

Alternate Solution:

$f(x) = -3x^2 + 24x$

$= -3(x^2 - 8x + 16 - 16)$

$= -3(x - 4)^2 + 48$

$\therefore$ max 48 ie) $f(4) = 48$