Semester 2 Notes: Week 1 – Week 4 (01/06/21 – 02/04/21)

Table of Contents:

Lesson One

1/12/21 Negative Exponents & Exponential Functions

Warm-up

① $x^6 \cdot x^5 = x^{6+5} = \boxed{x^{11}}$ (× : +)

② $x^3y^2 \cdot x^4y^{10}$

$x^{3+4}\, y^{2+10} = \boxed{x^7y^{12}}$

③ $\frac{A^3}{A^2} = A^{3-2} = \boxed{A^1}$ (÷ : −)

④ $\frac{A^{10}B^4}{A^6B^2} = A^{10-6}\, B^{4-2}$

$\boxed{A^4B^2}$

- I can evaluate expressions containing negative exponents

* negative exponents need to take an elevator ride *

$\frac{3}{1} = 3$

$\frac{1}{2}$

$\frac{4}{1}$

Top floor / Bottom floor

① $\frac{1}{3^{-2}} = \frac{3^2}{1} = \frac{3 \cdot 3}{1} = 9$

② $\frac{2^{-4}}{1} = \frac{1}{2^4} = \frac{1}{16} = .06$

③ $\frac{1}{5^{-2}} = \frac{5^2}{1} = \frac{25}{1} = 25$

Lesson two

Graphing Exponential Functions

Warm-up

① $\frac{3^{-2}}{1} = \frac{1}{3^2} = \boxed{\frac{1}{9}}$

② $\frac{1}{2^{-3}} = \frac{2^3}{1} = \boxed{8}$

③ Use the table

$y = x + 3$

$0+3$

$1+3$

$2+3$

x	y
0	3
1	4
2	5

$y = b^x$ (parent function)

To Graph: Always start out with a table

X	Y
-2	1/4
-1	1/2
0	1
1	2
2	4

X y

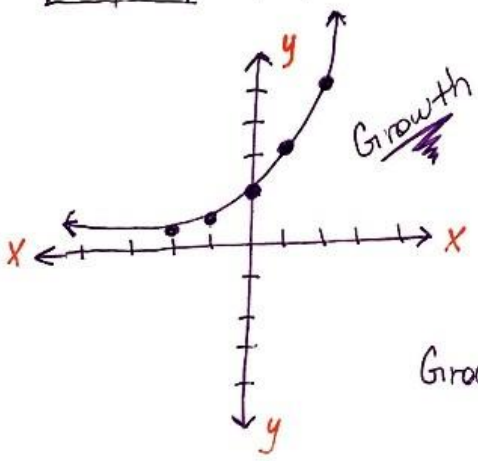
$(-2, \frac{1}{4})$ .25

$(-1, \frac{1}{2})$ .5

$(0, 1)$

$(1, 2)$

$(2, 4)$



$y = 2^x$ Plug in each "x" at a time.

$y = \frac{2^{-2}}{1} = \frac{1}{2^2} = \frac{1}{4}$

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

$y = 2^0 = 1$

$y = 2^1 = 2$

$y = 2^2 = 4$

Growth = "b" is a whole #

$y = b^x$

Example 2 : $y = \left(\frac{1}{2}\right)^x$

Decay "B" is a fraction

X	y	
-2	4	(-2, 4)
-1	2	(-1, 2)
0	1	(0, 1)
1	1/2	(1, 1/2)
2	1/4	(2, 1/4)

you need 5 points

$y = \left(\frac{1}{2}\right)^{-2} = (2)^2 = 4$

$y = \left(\frac{1}{2}\right)^{-1} = (2)^1 = 2$

$y = \left(\frac{1}{2}\right)^0 = 1$

$y = \left(\frac{1}{2}\right)^1 = \frac{1}{2}$

$y = \left(\frac{1}{2}\right)^2 = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$

Lesson 3

12/02/2021 Radical Equations √

Warm-up

① Find the rate of change over the interval [0, 1] for $y = 3^x$

$\frac{y_2 - y_1}{x_2 - x_1}$

$x = 0$ $x = 1$

$y = 3^0$ $y = 3^1$

$y = 1$ $y = 3$

$(0, 1)$ $(1, 3)$

x_1, y_1 x_2, y_2

$(0, 1)(1, 3)$

$\frac{3 - 1}{1 - 0} = \boxed{\frac{2}{1}}$

- I can solve equations w/ radical expressions √

Ex 1)

$\sqrt{x-3} + 8 = 15$

$-8 \quad -8$

$(\sqrt{x-3})^2 = (7)^2$

$x - 3 = 49$

$+3 \quad +3$

$\boxed{x = 52}$

Check solution:

$\sqrt{x-3} + 8 = 15$

$\sqrt{52-3} + 8 = 15$

$\sqrt{49} + 8 = 15$

$7 + 8 = 15$ ✓

$15 = 15$

1st : solve

2nd: check solution

Ex 2)

$$\frac{2\sqrt{x+5}}{2} = \frac{-8}{2}$$

$$(\sqrt{x+5})^2 = (-4)^2$$

$$x+5 = 16$$

$$-5 \quad -5$$

$$x = 11$$

NO Solution

$\sqrt{36} = 6$

$6^2 = 36$

Check solution:

$2\sqrt{x+5} = -8$

$2\sqrt{11+5} = -8$

$2\sqrt{16} = -8$

$(2)\,4 = -8$

$8 = -8$ ✗

Ex 3)

$$(\sqrt{x+3})^2 = (2)^2$$

$$x+3 = 4$$

$$-3 \quad -3$$

$$\boxed{x = 1}$$

Check solution:

$\sqrt{x+3} = 2$

$\sqrt{1+3} = 2$

$\sqrt{4} = 2$

$2 = 2$ ✓

Lesson 4

02/04/2021 Radical Equations Part 2

- I can solve equations containing Radical Expressions

Warm-up

① $(\sqrt{x+2})^2 = (4)^2$

$x+2 = 16$

$-2 \quad -2$

$\boxed{x = 14}$

Check Solution

$\sqrt{x+2} = 4$

$\sqrt{14+2} = 4$

$\sqrt{16} = 4$

$4 = 4$ ✓

Example 1) $(\sqrt{6-a})^2 = (\sqrt{a+10})^2$

$6 - a = a + 10$

$+a \quad +a$

$6 = 2a + 10$

$-10 \quad -10$

$-4 = 2a$

$\frac{-4}{2} = \frac{2a}{2}$

$\boxed{-2 = a}$

Check Solution:

$\sqrt{6-a} = \sqrt{a+10}$

$\sqrt{6+2} = \sqrt{-2+10}$

$\sqrt{8} = \sqrt{8}$ ✓

Lesson 5

Quiz Review:

Exponential Functions (using a table)

① $y = 3^x$

x	y
-2	1/9
-1	1/3
0	1
1	3
2	9

$(-2, \frac{1}{9})$ $(-1, \frac{1}{3})$ $(0, 1)$ $(1, 3)$ $(2, 9)$

Growth

$y = \frac{3^{-2}}{1} = \frac{1}{3^2} = \frac{1}{9}$

$y = \frac{3^{-1}}{1} = \frac{1}{3^1} = \frac{1}{3}$

$y = 3^0 = 1$

$y = 3^1 = 3$

$y = 3^2 = 9$

Rate of Change

Find the rate of change over the interval $[2, 4]$ for $y = 3x + 1$

$X = 2$ $X = 4$

$y = 3(2) + 1$

$y = 6 + 1$

$y = 7$ $(2, 7)$

$y = 3(4) + 1$

$y = 12 + 1$

$y = 13$ $(4, 13)$

$x_1\ y_1\ x_2\ y_2$ Rate of change

$(2, 7)(4, 13)$ $\frac{y_2 - y_1}{x_2 - x_1}$

$\frac{13 - 7}{4 - 2} = \frac{6}{2} = \boxed{\frac{3}{1}}$