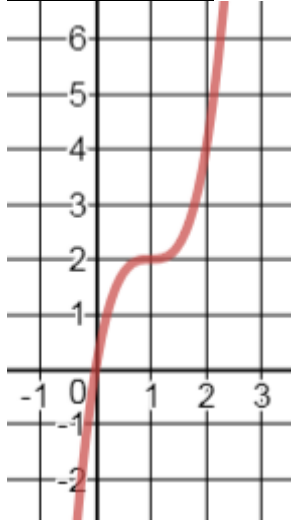


Summary of 1st Semester IM3

Cubic Functions



$$f(x) = 2(x-1)^3 + 2$$

Domain: All real numbers

Range: All real numbers

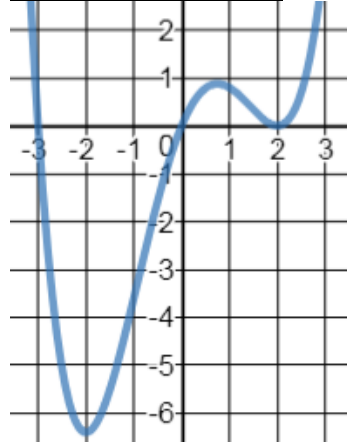
Zeros/Roots: $x = 0$

y-intercept: $(0,0)$

Increasing: $-\infty < x < \infty$

Average Rate of Change on $[1,2]$ is 2

Polynomial Functions



$$g(x) = \frac{1}{5}x(x-2)^2(x+3)$$

Domain: All real numbers

Range: $y \geq -6.4$

Zeros/Roots: $x = -3, 0, 2$

y-intercept: $(0,0)$

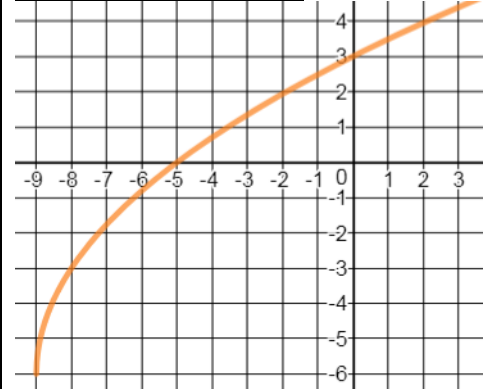
Increasing: $-2 < x < 0.75$ & $x > 2$

Decreasing: $x < -2$ & $0.75 < x < 2$

Average Rate of Change on $[1,2]$ is -0.8

Max: $(-0.75, 0.9)$ Min: $(-2, -6.4)$ & $(-2, 0)$

Square Root Functions



$$h(x) = 3(x+9)^{1/2} - 6$$

Domain: $x \geq -9$

Range: $y \geq -6$

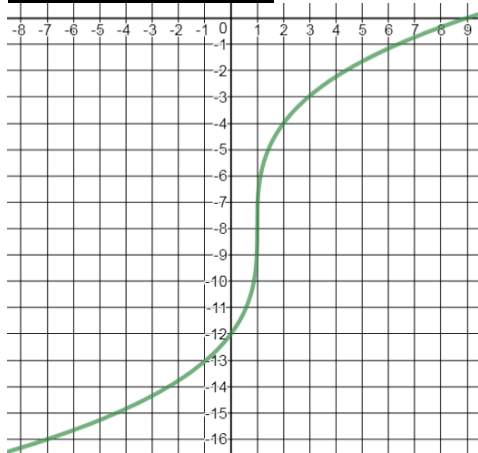
Zeros/Roots: $x = -5$

y-intercept: $(0,3)$

Increasing: $x > -9$

Average Rate of Change on $[-5,0]$ is $\frac{3}{5}$

Cube Root Functions



$$a(x) = 4\sqrt[3]{x-1} - 8$$

Domain: All real numbers

Range: All real numbers

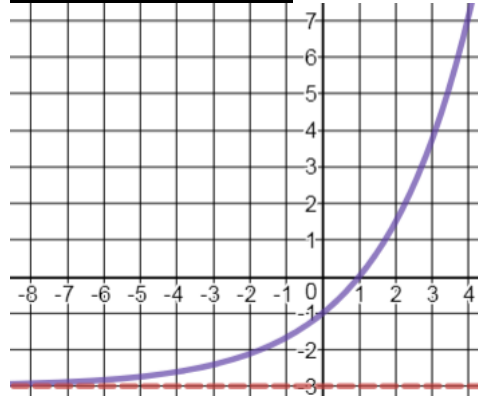
Zeros/Roots: $x = 9$

y-intercept: $(0, -12)$

Increasing: $-\infty < x < \infty$

Average Rate of Change on $[1,9]$ is 1

Exponential Functions



$$b(x) = 2(1.5)^x - 3$$

Domain: All real numbers

Range: $y > -3$

Zeros/Roots: $x = 1$

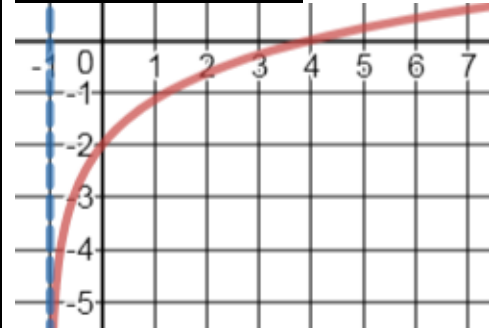
y-intercept: $(0, -1)$

Increasing: $-\infty < x < \infty$

Average Rate of Change on $[1,1]$ is 1

Asymptote: $y = -3$

Logarithmic Functions



$$c(x) = 2\log_5(x+1) - 2$$

Domain: $x > -1$

Range: All real numbers

Zeros/Roots: $x = 4$

y-intercept: $(0, -2)$

Increasing: $x > -1$

Average Rate of Change on $[0,4]$ is $\frac{1}{2}$

Asymptote: $x = -1$

Solving Equations Algebraically and Graphically

$$\frac{1}{5}x(x-2)^2(x+3) = 0$$

$$x = 0, 2, -3$$

$$3(x+9)^{1/2} - 6 = -3$$

$$3(x+9)^{1/2} = 3$$

$$(x+9)^{1/2} = 1$$

$$x+9 = 1$$

$$x = -8$$

$$3(x+9)^{1/2} - 6 = -12$$

$$3(x+9)^{1/2} = -6$$

$$(x+9)^{1/2} = -2$$

No Solution

$$4\sqrt[3]{x-1} - 8 = -12$$

$$4\sqrt[3]{x-1} = -4$$

$$\sqrt[3]{x-1} = -1$$

$$x-1 = -1$$

$$x = 0$$

$$2(1.5)^x - 3 = -1$$

$$2(1.5)^x = 2$$

$$(1.5)^x = 1$$

$$x = 0$$