

§1.2: FUNCTION REPERTORY

- 1.] Determine if the following function is algebraic or transcendental. Specifically, what type of function is it? Find the domain and intercepts of the function. Sketch a rough drawing of the function

Algebraic, Polynomial, Quadratic Function

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

Domain: $(-\infty, \infty)$

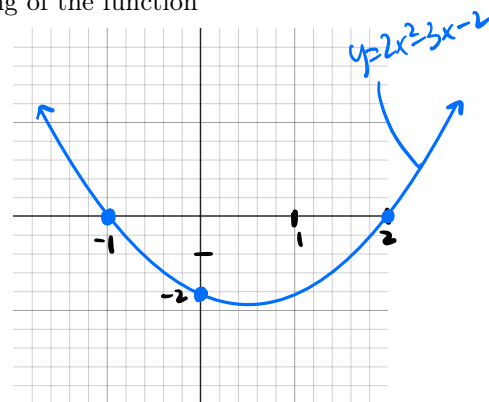
X-int(s): $2x^2 - 3x - 2 = 0$

$$\Rightarrow (2x+1)(x-2) = 0$$

$$\Rightarrow x = -\frac{1}{2}, 2$$

y-int: $f(0) = 2(0)^2 - 3(0) - 2$

$$f(0) = -2$$



- 2.] Determine if the following function is algebraic or transcendental. Specifically, what type of function is it? Find the domain and intercepts of the function. Sketch a rough drawing of the function

Algebraic, Power Function

$$f(x) = \sqrt[3]{x}$$

$$\Rightarrow f(x) = x^{1/3}$$

Domain: $(-\infty, \infty)$

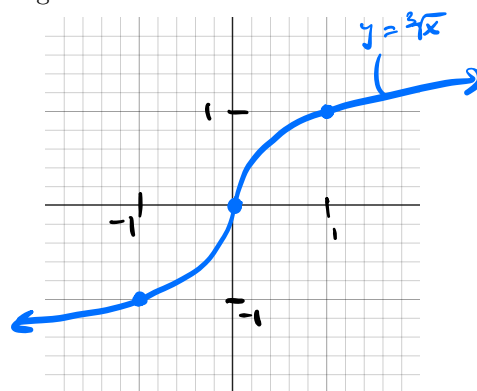
X-int(s): $x^{1/3} = 0$

$$\Rightarrow x = 0^3$$

$$\Rightarrow x = 0$$

y-int: $f(0) = 0^{1/3}$

$$f(0) = 0$$



- 3.] Determine if the following function is algebraic or transcendental. Specifically, what type of function is it? Find the domain, asymptotes, and intercepts of the function. Sketch a rough drawing of the function

Algebraic, Rational Function

$$f(x) = \frac{x^2 + 2x}{x + 1}$$

$$\Rightarrow f(x) = \frac{x(x+2)}{x+1}$$

Domain: $x+1 \neq 0 \Rightarrow x \neq -1$

$$(-\infty, -1) \cup (-1, \infty)$$

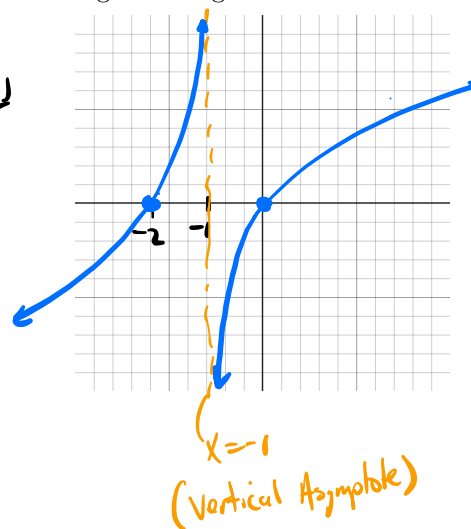
There is a vertical asymptote at $x = -1$.

X-int(s): $x(x+2) = 0$

$$x = -2, 0$$

y-int: $f(0) = \frac{0(0+2)}{0+1}$

$$f(0) = 0$$



- 4.] Determine if the following function is algebraic or transcendental. Specifically, what type of function is it? Find the domain, asymptotes, and intercepts of the function. Sketch a rough drawing of the function

Transcendental, Exponential Function

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

Domain: $(-\infty, \infty)$

x-int(s): $2^x = 0$

$$x = \log_2(0)$$

$$x = \text{DNE}$$

No x-intercepts, horizontal asymptote at $y=0$.

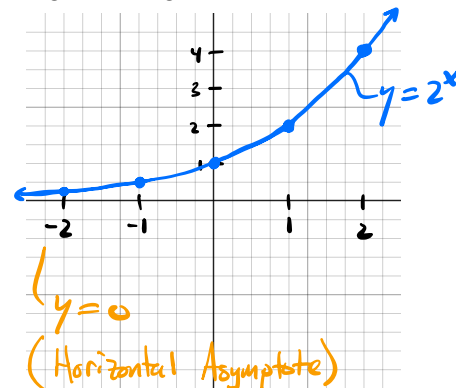
$$x = -2: f(-2) = 2^{-2} = \frac{1}{4}$$

$$x = -1: f(-1) = 2^{-1} = \frac{1}{2}$$

y-int: $x = 0: f(0) = 2^0 = 1$

$$x = 1: f(1) = 2^1 = 2$$

$$x = 2: f(2) = 2^2 = 4$$



- 5.] Determine if the following function is algebraic or transcendental. Specifically, what type of function is it? Find the domain, range, and intercepts of the function and then sketch the graph of the function.

Transcendental, Trigonometric Function

$$f(x) = \sin(x)$$

Domain: $(-\infty, \infty)$

Range: $[-1, 1]$

x-int(s): $\sin(x) = 0$

$$x = \dots -2\pi, -\pi, 0, \pi, 2\pi, \dots$$

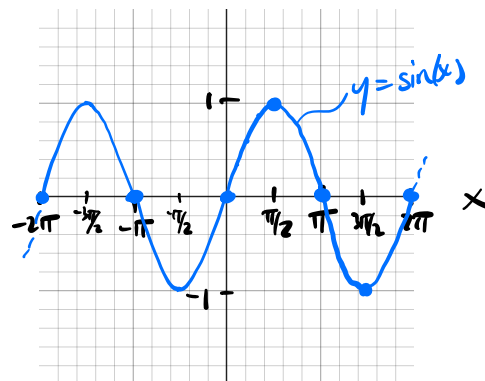
$$x = 0: f(0) = \sin(0) = 0$$

$$x = \frac{\pi}{6}: f(\frac{\pi}{6}) = \sin(\frac{\pi}{6}) = \frac{1}{2}$$

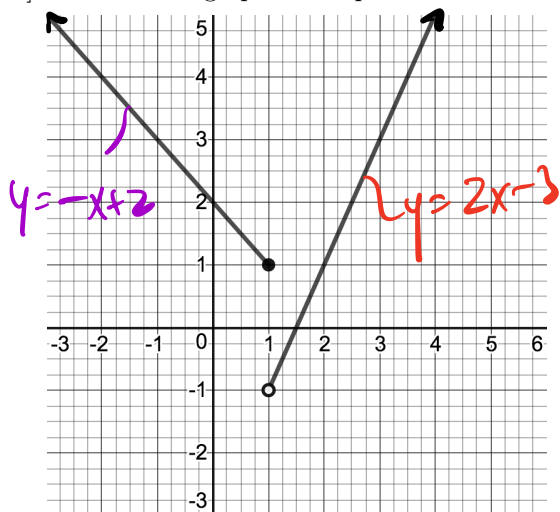
$$x = \frac{\pi}{4}: f(\frac{\pi}{4}) = \sin(\frac{\pi}{4}) = \frac{\sqrt{2}}{2}$$

$$x = \frac{\pi}{3}: f(\frac{\pi}{3}) = \sin(\frac{\pi}{3}) = \frac{\sqrt{3}}{2}$$

$$x = \frac{\pi}{2}: f(\frac{\pi}{2}) = \sin(\frac{\pi}{2}) = 1$$



- 6.] Consider the graph of the piecewise function $f(x)$ below.



a.) Domain: $(-\infty, \infty)$

b.) Range: $(-1, \infty)$

c.) $f(2) = 1$

d.) $f(1) = 1$

e.) $f(3) = 3$

f.) $f(-1) = 3$

g.) f is decreasing on $(-\infty, 1)$

h.) f is increasing on $(1, \infty)$

Find an expression for the function $f(x)$.

$$f(x) = \begin{cases} -x + 2 & \text{if } x \leq 1 \\ 2x - 3 & \text{if } x > 1 \end{cases}$$