

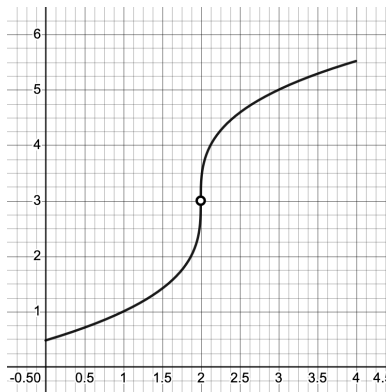
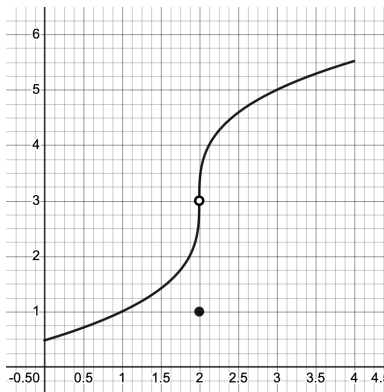
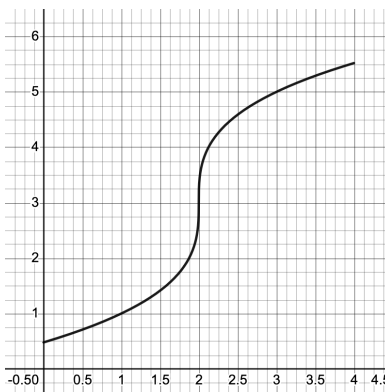
§2.2 (PART 1): LIMITS ALL AROUND THE PLANE

1.] Given the graph of the functions below, determine the limits:

$$f(x) = 2\sqrt[3]{x-2} + 3$$

$$g(x) = \begin{cases} 2\sqrt[3]{x-2} + 3 & \text{if } x \neq 2 \\ 1 & \text{if } x = 2 \end{cases}$$

$$h(x) = \begin{cases} 2\sqrt[3]{x-2} + 3 & \text{if } x \neq 2 \\ \text{undefined} & \text{if } x = 2 \end{cases}$$



a.) $\lim_{x \rightarrow 2} f(x)$

c.) $\lim_{x \rightarrow 2} g(x)$

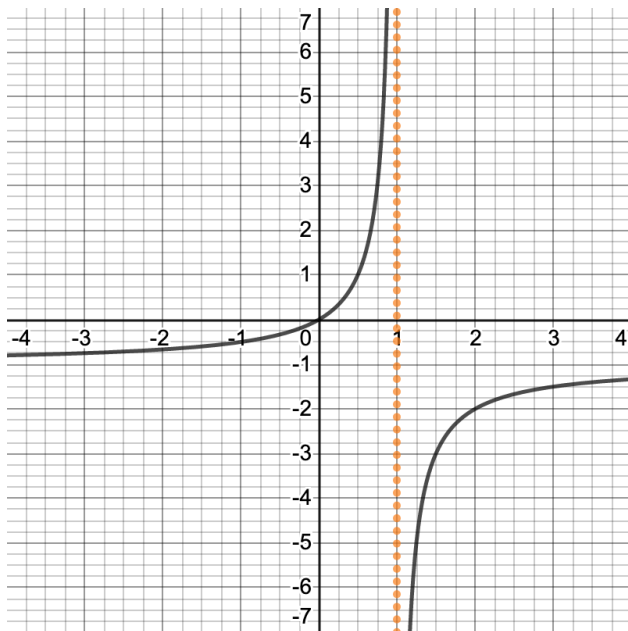
e.) $\lim_{x \rightarrow 2} h(x)$

b.) $f(2)$

d.) $g(2)$

f.) $h(2)$

2.] The graph of the function $f(x) = \frac{-x}{x-1}$ is shown below. Is $f(x)$ algebraic or transcendental? Answer questions below:



a.) Domain:

b.) Range:

c.) f is decreasing on

d.) f is increasing on

e.) $\lim_{x \rightarrow 2} f(x)$

f.) $f(2)$

g.) $\lim_{x \rightarrow 1^-} f(x)$

h.) $\lim_{x \rightarrow 1^+} f(x)$

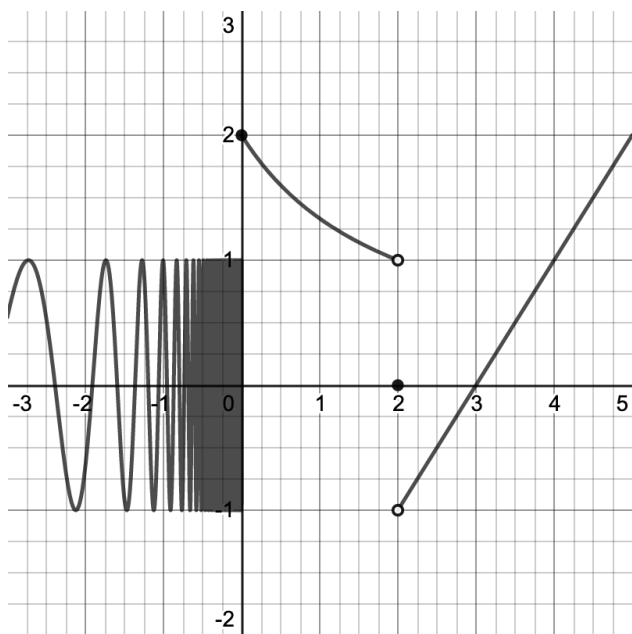
i.) $\lim_{x \rightarrow 1} f(x)$

j.) $f(1)$

3.] The graph of the piecewise function

$$f(x) = \begin{cases} \sin\left(\frac{30}{x}\right) & \text{if } x < 0 \\ \frac{4}{x+2} & \text{if } 0 \leq x < 2 \\ 0 & \text{if } x = 2 \\ x - 3 & \text{if } x > 2 \end{cases}$$

is given below. Evaluate the limits:



- a.) $\lim_{x \rightarrow 0^-} f(x)$
- b.) $\lim_{x \rightarrow 0^+} f(x)$
- c.) $\lim_{x \rightarrow 0} f(x)$
- d.) $f(0)$
- e.) $\lim_{x \rightarrow 2^-} f(x)$
- f.) $\lim_{x \rightarrow 2^+} f(x)$
- g.) $\lim_{x \rightarrow 2} f(x)$
- h.) $f(2)$

4.] Let $f(x) = \frac{x^2 - 5x + 6}{x - 2}$. Evaluate the limits $\lim_{x \rightarrow 2^-} f(x)$ and $\lim_{x \rightarrow 2^+} f(x)$ without using the graph but by evaluating the function directly using a computer algebra system (e.g. Desmos) or a calculator. Fill out the following tables below.

x	1.9	1.99	1.999	1.9999
$f(x)$				

$$\lim_{x \rightarrow 2^-} \frac{x^2 - 5x + 6}{x - 2} =$$

x	2.1	2.01	2.001	2.0001
$f(x)$				

$$\lim_{x \rightarrow 2^+} \frac{x^2 - 5x + 6}{x - 2} =$$

Using the evidence gathered above, deduce the value of the following limit, if it exists:

$$\lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x - 2} =$$