Day 1 Day 2

Author 1 ____________ ☐ ☐

Author 2 ____________ ☐ ☐

Author 3 ____________ ☐ ☐

Author 4 ____________ ☐ ☐

Group Work 02

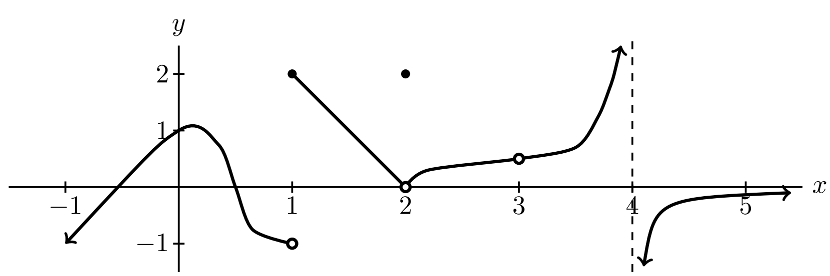
1. Let $f(x)$ be a mystery function for which some values are given approximately in the following table.

x	-2	-1	-0.5	-0.1	0	0.1	0.5	1	2
$f(x)$	0.45	0.84	0.96	0.998		0.998	0.96	0.84	0.45

(a) Based on this data, what do you think is the value of $f(0)$?

(b) Ask me what the mystery function is, and fill in the blank: $f(x) =$ ____________________.
Does this change your answer about $f(0)$? Explain.

2. Suppose the graph of a function $h(x)$ is given below. Find the value of each of the following below.



(a) $h(0) =$

(b) $h(1) =$

(c) $h(2) =$

(d) $h(3) =$

(e) $h(4) =$

3. Answer the following about f and h above.

(a) $\lim_{x\to 0} f(x) =$

(b) $\lim_{x\to 0} h(x) =$

(c) $\lim_{x\to 1} h(x) =$

(d) $\lim_{x\to 2} h(x) =$

(e) $\lim_{x\to 3} h(x) =$

(f) $\lim_{x\to 4} h(x) =$

4. Answer the following about f and h above.

(a) $\lim_{x\to 0^-} f(x) =$

(b) $\lim_{x\to 1^+} h(x) =$

(c) $\lim_{x\to 1^-} h(x) =$

(d) $\lim_{x\to 2^+} h(x) =$

(e) $\lim_{x\to 2^-} h(x) =$

(f) $\lim_{x\to 4^-} h(x) =$

5. Investigate $\lim_{x\to 0^+} \sin\left(\frac{\pi}{2x}\right)$ by following the steps below.

(a) Fill in the table below, and use it to make a guess about $\lim_{x\to 0^+} \sin\left(\frac{\pi}{2x}\right)$. (I did the first one.)

x	$\frac{1}{2}$	$\frac{1}{50}$	$\frac{1}{100}$	$\frac{1}{1000}$
$\sin\left(\frac{\pi}{2x}\right)$	$\sin(\pi) = \boxed{0}$			

(b) Find the value of $\sin\left(\frac{\pi}{2x}\right)$ when $x = \frac{1}{1001}$. Does this change your guess about $\lim_{x\to 0^+} \sin\left(\frac{\pi}{2x}\right)$?

(c) Use your phone to graph $\sin\left(\frac{\pi}{2x}\right)$ at `www.desmos.com` or `www.wolframalpha.com`. Give your final to $\lim_{x\to 0^+} \sin\left(\frac{\pi}{2x}\right)$ below. Make sure to explain!

6. Find the following given that $g(x) = \begin{cases} \ln x, & \text{if } 0 < x < 1 \\ e^{x-1} - 1, & \text{if } 1 < x \le 2 \\ x + e, & \text{if } x > 2 \end{cases}$.

(a) $\lim_{x\to 1^+} g(x) =$

(b) $\lim_{x\to 1^-} g(x) =$

(c) $\lim_{x\to 1} g(x) =$

(d) $\lim_{x\to 2^+} g(x) =$

(e) $\lim_{x\to 2^-} g(x) =$

(f) $\lim_{x\to 2} g(x) =$

(g) As a follow-up, find all $a > 0$ such that $\lim_{x\to a} f(x)$ DNE.