

Discovering Horizontal and Vertical Asymptotes

① Example: Sketch the function that satisfies the stated conditions.

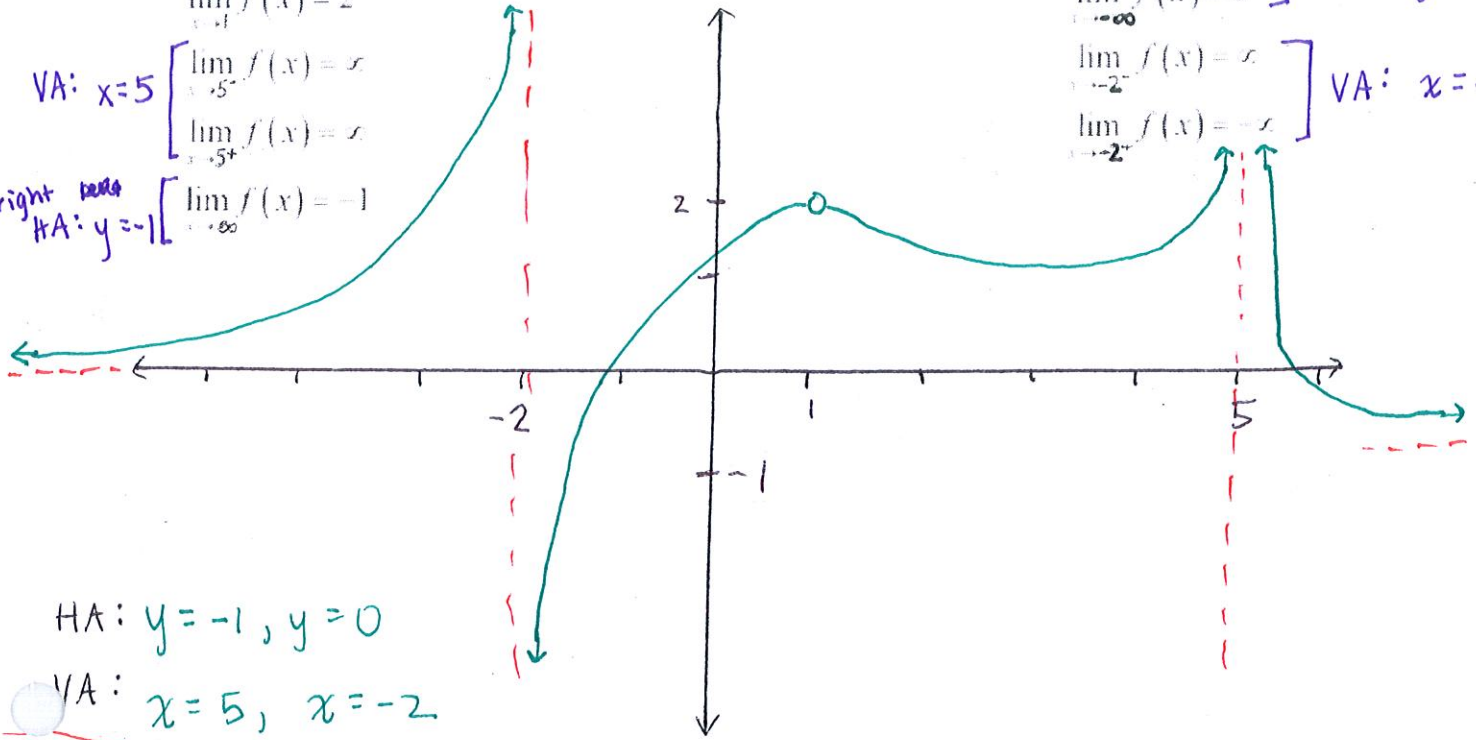
$$\lim_{x \rightarrow 1} f(x) = 2$$

$$VA: x=5 \begin{cases} \lim_{x \rightarrow 5^-} f(x) = \infty \\ \lim_{x \rightarrow 5^+} f(x) = -\infty \end{cases}$$

$$\text{right side } HA: y=-1 \begin{cases} \lim_{x \rightarrow -\infty} f(x) = -1 \end{cases}$$

$$\lim_{x \rightarrow -\infty} f(x) = 0 \quad \left. \begin{array}{l} \text{left} \\ HA: y=0 \end{array} \right\}$$

$$\lim_{x \rightarrow -2^+} f(x) = \infty \quad \left. \begin{array}{l} \lim_{x \rightarrow -2^-} f(x) = -\infty \\ VA: x=-2 \end{array} \right\}$$



$$HA: y = -1, y = 0$$

$$VA: x = 5, x = -2$$

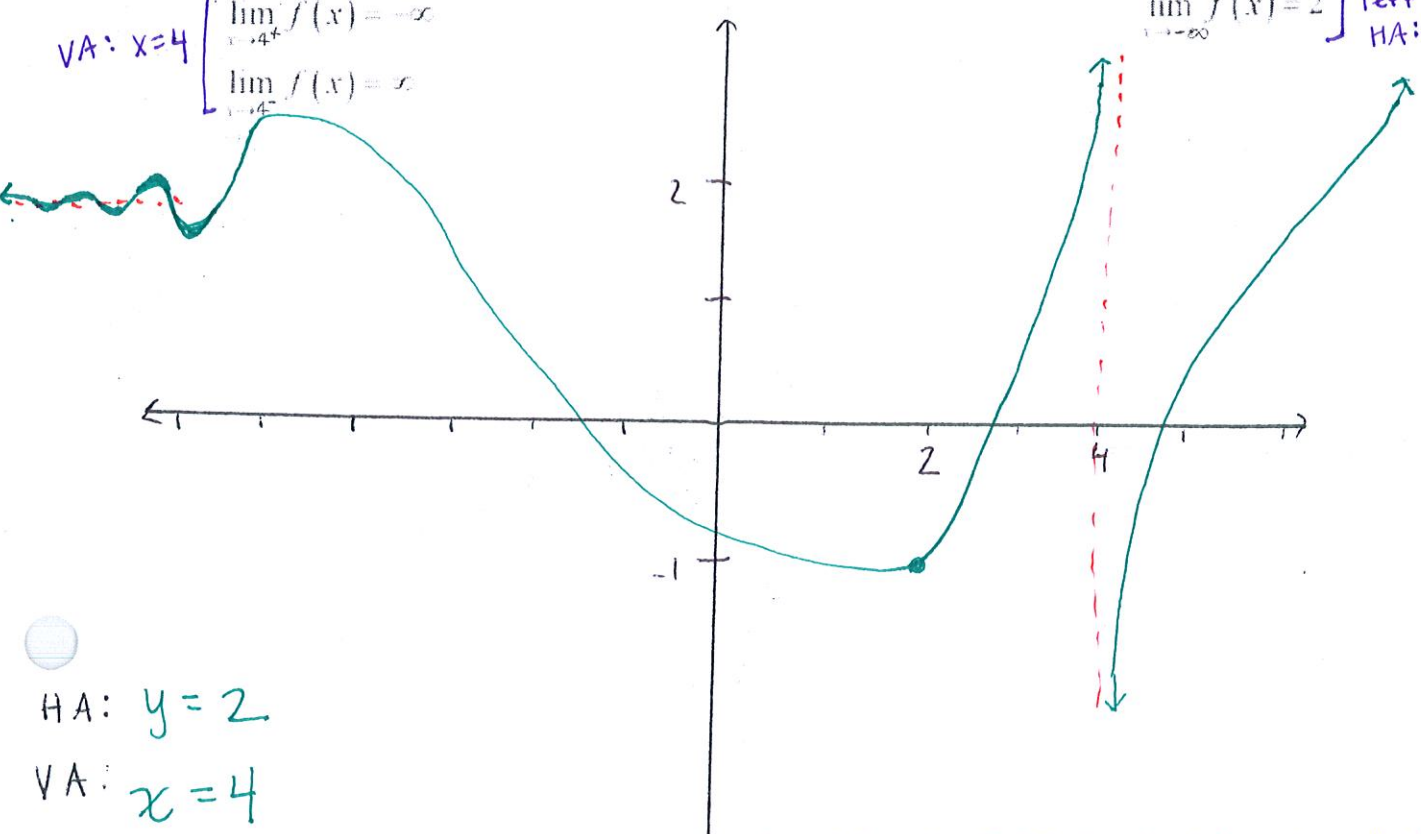
② Example: Sketch the function that satisfies the stated conditions.

$$\lim_{x \rightarrow 2} f(x) = -1$$

$$VA: x=4 \begin{cases} \lim_{x \rightarrow 4^+} f(x) = -\infty \\ \lim_{x \rightarrow 4^-} f(x) = \infty \end{cases}$$

$$\lim_{x \rightarrow \infty} f(x) = \infty \quad \left. \begin{array}{l} \text{Right} \\ HA: \text{none} \end{array} \right\}$$

$$\lim_{x \rightarrow -\infty} f(x) = 2 \quad \left. \begin{array}{l} \text{left} \\ HA: y=2 \end{array} \right\}$$



$$HA: y = 2$$

$$VA: x = 4$$