

AP Calc AB
Criterion graphing with limits

Sketch a graph of the $f(x)$ given the following information:

$$1. \quad \begin{array}{lll} \lim_{x \rightarrow -\infty} f(x) = -2 & \lim_{x \rightarrow -5^-} f(x) = -\infty & \lim_{x \rightarrow -5^+} f(x) = \infty \\ \lim_{x \rightarrow 0^-} f(x) = 3 & \lim_{x \rightarrow 0^+} f(x) = -4 & f(0) = -4 \\ \lim_{x \rightarrow 4} f(x) = 3 & f(4) = -1 & \lim_{x \rightarrow \infty} f(x) = 7 \end{array}$$

$$2. \quad \begin{array}{lll} \lim_{x \rightarrow -\infty} f(x) = -\infty & f(-9) = 7 & f(-8) = 8 \\ f(-7) = 7 & \lim_{x \rightarrow -3^-} f(x) = 3 & \lim_{x \rightarrow -3^+} f(x) = -8 \\ f(-3) = -8 & \lim_{x \rightarrow 1^-} f(x) = -4 & \lim_{x \rightarrow 1^+} f(x) = 5 \\ f(1) \text{ is undefined} & \lim_{x \rightarrow \infty} f(x) = \infty & \end{array}$$

$f(x)$ is strictly decreasing on the interval $(1, 4)$ and strictly increasing on the interval $(4, \infty)$.

$f(x)$ has only one root.

$$3. \quad \text{The domain of } f(x) \text{ is } (-8, -3) \cup (-3, \infty).$$

$$\begin{array}{lll} \lim_{x \rightarrow -8^+} f(x) = -3 & \lim_{x \rightarrow -3^-} f(x) = 3 & \lim_{x \rightarrow -3^+} f(x) = -1 \\ \lim_{x \rightarrow 2^-} f(x) = -6 & \lim_{x \rightarrow 2^+} f(x) = 1 & f(2) = -6 \\ \lim_{x \rightarrow \infty} f(x) = 5 & & \end{array}$$