Section 2.4: The Precise Definition of a Limit

(1) Explain the precise definition of a limit in your own words. What is the role of δ and of ε?

(2) You will be asked to find a δ given a specific ε in both graph questions and given functions (usually linear). If you are given a specific value for ε you should get a specific value for δ. If you are asked to do it for a general ε, then your answer for δ will be in terms of ε. Let's practice that in an example. Let $f(x) = 2x + 1$. We will show that $\lim_{x\to 3} f(x) = 7$

(a) Fill in the blanks:

For every _____ there exists _____, such that _____$< \varepsilon$ whenever _____$< \delta$.

(b) Let $\varepsilon = .5$. Find δ so that $|f(x) - 7| < \varepsilon$ whenever $|x - 3| < \delta$. Illustrate with a graph.

(c) Let $\varepsilon = .01$. Find δ so that $|f(x) - 7| < \varepsilon$ whenever $|x - 3| < \delta$. Illustrate with a graph.

(d) Find δ(in terms of ε) so that $|f(x) - 7| < \varepsilon$ whenever $|x - 3| < \delta$. Illustrate with a graph.

Extra Practice in Book: 2.4:1, 3, 11, 15, 17