2.2 The Precise Definition of a Limit

Precise definition of a limit

EXAMPLE: Use the ε-δ definition of a limit to prove that $\lim_{x\to 3} 5x - 4 = 11$.

Proof:

Scratchwork:

EXAMPLE: Use the ε-δ definition of a limit to prove that $\lim_{x\to -4} \frac{x}{2} + 6 = 4$.

Proof: Scratchwork:

EXAMPLE: In the following exercises, find an open interval about x_0 on which the inequality $|f(x) - L| < \varepsilon$ holds. Then give the largest value for $\delta > 0$ such that for all x satisfying $0 < |x - x_0| < \delta$ the inequality $|f(x) - L| < \varepsilon$ holds:

a.) $f(x) = 2x - 2$, L = -6, $x_0 = -2$, $\varepsilon = 0.02$

b.) $f(x) = \sqrt{x-7}$, L = 4, $x_0 = 23$, $\varepsilon = 1$

c.) $f(x) = 1/x$, L = -1, $x_0 = -1$, $\varepsilon = 0.1$

d.) $f(x) = x^2$, L = 3, $x_0 = \sqrt{3}$, $\varepsilon = 0.1$ (Round answers to four decimal places)