Sign up for Khan Academy with coach code 3XDPSR.

Read sections 1.1 and 1.2 in your textbook

HW due Tues (8th per)/Wed (7th per): 1.2 #1-6 all, 15-22 all, 33,34,39,41

Find L & δ if $\varepsilon = 0.01$

33. $\lim_{x \to 2} (3x+2)$

34. $\lim_{x \to 6} \left(6 - \frac{x}{3}\right)$

Prove.

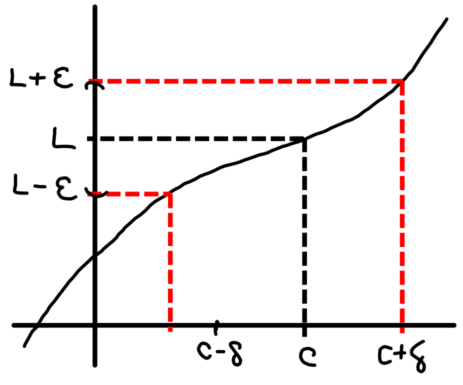
39. $\lim_{x \to -4} \left(\frac{1}{2}x - 1\right)$

41. $\lim_{x \to 6} 3$

$\varepsilon - \delta$ Definition of the Limit:

$\lim_{x \to c} f(x) = L$ if given $\varepsilon > 0$, there exists a $\delta > 0$ such that

$|f(x) - L| < \varepsilon$ whenever $0 < |x - c| < \delta$.



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$f(x) = -5x+3$; find $\lim_{x\to 1} f(x)$ & find a δ.

$$\lim_{x\to 1}(-5x+3) = -5(1)+3 = \boxed{-2 = L}$$

Let $\varepsilon > 0$ be given.

$$|f(x)-L| = |-5x+3-(-2)| = |-5x+5| =$$

$$= |-5(x-1)| = |-5||x-1| = 5|x-1| < \varepsilon$$

$$|x-1| < \boxed{\varepsilon/5 = \delta}$$

Prove that the limit is L using the $\varepsilon - \delta$ definition of the limit.

28. $\lim_{x\to -3}(2x+5) = 2(-3)+5 = -6+5 = \boxed{-1 = L}$

Let $\varepsilon > 0$ be given.

$$|f(x)-L| = |2x+5-(-1)| = |2x+6| = 2|x+3| =$$

$$= 2|x-(-3)| < \varepsilon$$

$$|x+3| < \varepsilon/2$$

Take $\delta = \varepsilon/2$. Then whenever $|x+3| < \delta$, we have that

$$|f(x)-L| = |f(x)-(-1)| = 2|x+3| < 2\cdot\delta = 2\cdot\frac{\varepsilon}{2} = \varepsilon$$

i.e. $|f(x)-L| < \varepsilon$

and hence $\lim_{x\to -3} f(x) = -1$. □

Find δ for $\varepsilon = 0.01$

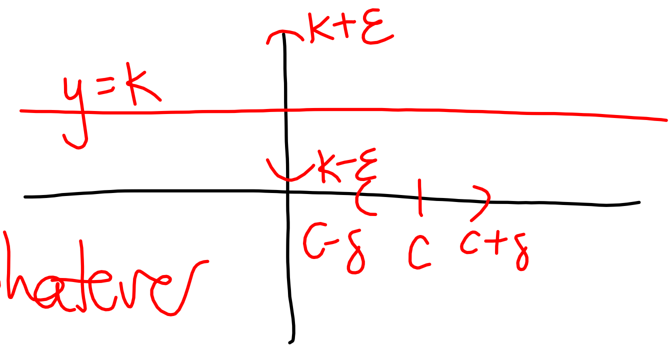
24. $\lim_{x \to 4} \left(4 - \frac{x}{2}\right) = 4 - \frac{4}{2} = 4 - 2 = \boxed{2 = L}$

$\left|4 - \frac{x}{2} - 2\right| = \left|-\frac{1}{2} \cdot \frac{x}{1} + 2\right| = \left|-\frac{1}{2}(x - 4)\right|$

$\varepsilon = 0.01$ $\qquad = \frac{1}{2}|x-4| < \varepsilon$

$\boxed{\delta = 0.02}$ $\qquad |x-4| < \boxed{2\varepsilon = \delta}$

$\lim_{x \to c} K$



Take δ to be whatever

$\delta = \varepsilon$

$|f(x) - L| = |K - K| = 0 < \varepsilon$

Find δ for $\varepsilon = 0.01$

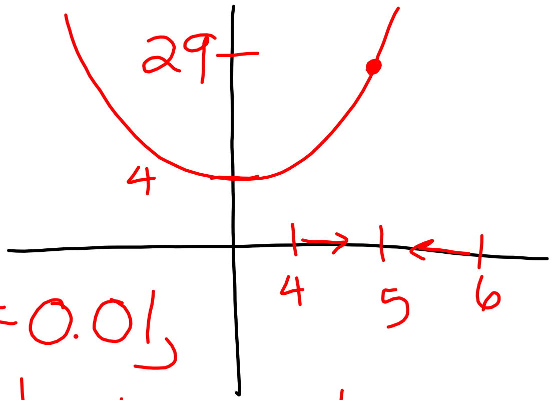
26. $\lim_{x \to 5}(x^2 + 4) = 5^2 + 4 = 29$

$f(x) = x^2 + 4$

$L = 29$

$c = 5$

Given $\varepsilon = 0.01$,



$|f(x) - L| = |x^2 + 4 - 29| = |x^2 - 25| =$

$= |(x+5)(x-5)|$

$< 12|x-5| < \varepsilon$

$\delta = \varepsilon/12$

$4 < x < 6$

$9 < x+5 < 11$

$|x+5| < 12$