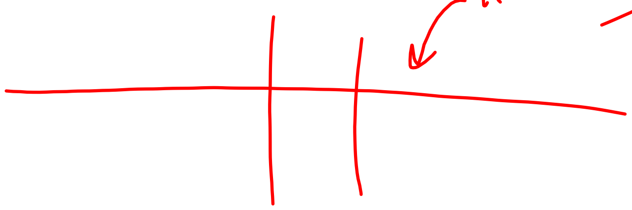
1.2 # 1-5 odd
15-21 odd
23, 24

due Fri

37, 39, 41 → find δ

$$\lim_{x \to 0} \frac{\sin x}{x}$$

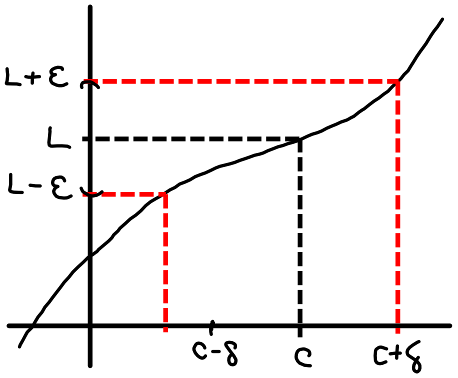
#'s in radians



$\varepsilon - \delta$ 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.

$L = -2$, $c = 1$

Let $\varepsilon > 0$ be given.

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

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

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

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

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

c

$|2x+5-(-1)| = |2x+6| = 2|x+3| < \varepsilon$

$x-(-3)$

$|x+3| < \boxed{\varepsilon/2 = \delta}$

Find δ for $\varepsilon = 0.01$

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

c

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

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

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

$\varepsilon = 0.01$

$\Rightarrow \boxed{\delta = 0.02}$

Find δ for $\varepsilon = 0.01$

26. $\lim\limits_{\underbrace{x\to 5}_{=c}} (x^2+4) = 5^2+4 = \underline{29 = L}$

Let $\varepsilon > 0$ be given.

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

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

since $x \to 5$ $\quad 4 < x < 6 \Rightarrow 9 < x+5 < 11$

$|x+5| < 11$

$\Rightarrow |x+5||x-5| < 11|x-5| < \varepsilon$

$|x-5| < \boxed{\varepsilon/11 = \delta}$

Graph the rational function.

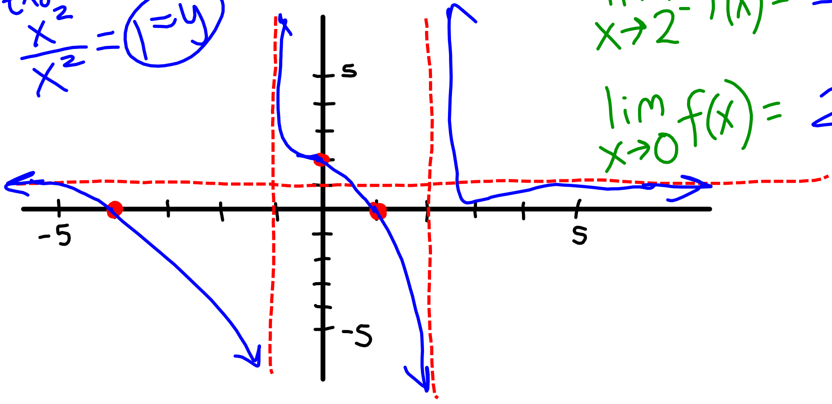
$f(x) = \dfrac{(x+4)(x-1)}{(x-2)(x+1)} \approx \dfrac{x^2 + \sim}{x^2+\sim}$

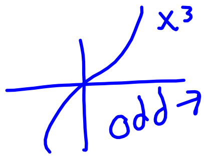
End behavior: $\dfrac{x^2}{x^2} = 1 = y$

$\lim\limits_{x\to\infty} f(x) = 1$

$\lim\limits_{x\to 2^-} f(x) = -\infty$

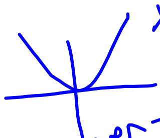
$\lim\limits_{x\to 0} f(x) = 2$





x^3

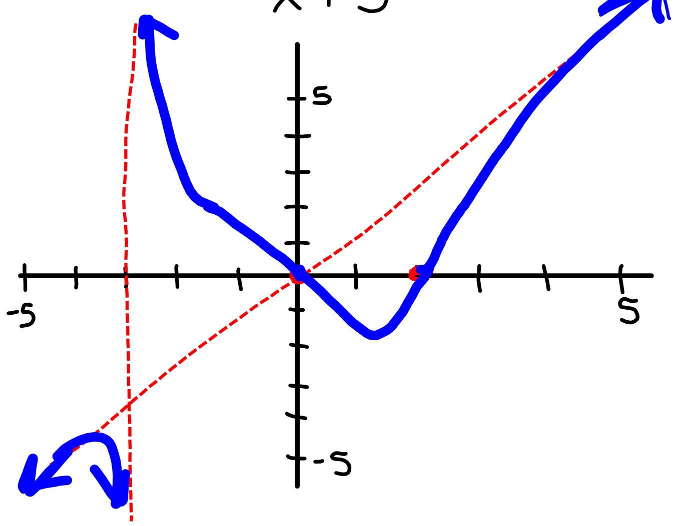
odd → cross thru



x^2

even → bounces off

$$f(x) = \frac{x^1(x-2)^1}{x+3} \approx \frac{x^2}{x} = x$$



$\lim_{x \to -\infty} f(x) = -\infty$

$\lim_{x \to -3^+} f(x) = \infty$

$\lim_{x \to 2} f(x) = 0$