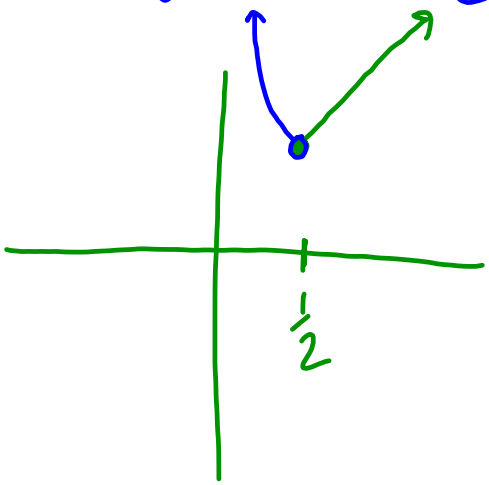
Q.37 #11c) $f(x) = \begin{cases} 4x, & x \geq \frac{1}{2} \\ \frac{1}{x}, & x < \frac{1}{2} \end{cases}$

$\lim_{x \to \frac{1}{2}} f(x) = 2$

$\frac{1}{2}^-$ $\frac{1}{2}^+$

left right



Lesson 5B: Other Occurrences of Limits

Finding Holes: Indeterminate Form "$\frac{0}{0}$"

4 Methods:

1. Evaluate the limits below algebraically.

a) $\lim_{x \to 5} \frac{x^2 - 25}{x - 5}$

$= \lim_{x \to 5} \frac{(x-5)(x+5)}{x-5}$

$= \lim_{x \to 5} (x+5)$

$= 10$

b) $\lim_{x \to 3} \frac{\frac{1}{x-4} + 1}{x - 3}$

$\lim_{x \to 3} \left[\frac{1}{x-3}\right]\left[\frac{1}{x-4} + \frac{x-4}{x-4}\right]$

$= \lim_{x \to 3} \left[\frac{1}{x-3}\right]\left[\frac{x-3}{x-4}\right]$

$= \lim_{x \to 3} \frac{1}{x-4}$

$= -1$

1. Evaluate the limits below algebraically.

c) $\lim_{x\to 0}\frac{\sqrt{5x+1}-1}{x}$

$\cdot\frac{\sqrt{5x+1}+1}{\sqrt{5x+1}+1}$

$=\lim_{x\to 0}\frac{5x+1-1}{x(\sqrt{5x+1}+1)}$

$=\lim_{x\to 0}\frac{5}{\sqrt{5x+1}+1}$

$=\frac{5}{2}$

d) $\lim_{x\to 27}\frac{\sqrt[3]{x}-3}{27-x}$

$(u)^3=\sqrt[3]{x}=(x^{\frac{1}{3}})^3$

$u^3=x$

$x\to 27$

$u\to 3$

$\lim_{u\to 3}\frac{u-3}{27-u^3}$

$27-u^3=$

$3\ |\ -1\ 0\ 0\ 27$

$\quad -3\ -9\ -27$

$-1\ -3\ -9\ |\ 0R$

$(u-3)(-u^2-3u-9)=0$

$-(u-3)(u^2+3u+9)$

$\lim_{u\to 3}\frac{u-3}{-(u-3)(u^2+3u+9)}$

$=\lim_{u\to 3}\frac{-1}{u^2+3u+9}$

$=-\frac{1}{27}$