L5 (1.5) Limits - Part 2

$\cancel{\frac{0}{0}}$ $\frac{0}{*}$ $\frac{*}{0}$

Ex: Evaluate each limit if it exists. If it does not exist explain why.

a) $\lim_{x\to -1}\frac{2x}{4-x^2}$

$= \frac{2(-1)}{4-(-1)^2}$

$= \frac{-2}{3}$

b) $\lim_{x\to 2}\frac{x-2}{4-x^2}$

$!\,\frac{0}{0}$

a^2-b^2

$(a-b)(a+b)$

$= \lim_{x\to 2}\frac{x-2}{(2-x)(2+x)}$

$= \lim_{x\to 2}\frac{\cancel{x-2}}{-\cancel{(x-2)}(2+x)}$

$= \frac{-1}{4}$

c) $\lim_{x\to 0}\frac{\sqrt{x+3}-\sqrt{3-x}}{x}\cdot\frac{\sqrt{x+3}+\sqrt{3-x}}{\sqrt{x+3}+\sqrt{3-x}}$

$= \lim_{x\to 0}\frac{(x+3)-(3-x)}{x\left(\sqrt{x+3}+\sqrt{3-x}\right)}$

$= \lim_{x\to 0}\frac{2\cancel{x}}{\cancel{x}\left(\sqrt{x+3}+\sqrt{3-x}\right)}$

$= \frac{\cancel{2}}{\cancel{2}\sqrt{3}}$ $= \frac{1}{\sqrt{3}}$

d) $\lim_{x\to -6}\sqrt{x+6}$

$= \text{DNE}$

$\because$ $\lim_{x\to -6^+}\sqrt{x+6} = 0$

$+$ $\lim_{x\to -6^-} = \text{DNE}$

e) $\lim_{x\to -4}\frac{x-5}{x^2-x-20}$

$= \lim_{x\to -4}\frac{\cancel{(x-5)}}{\cancel{(x-5)}(x+4)}$

$= \text{DNE}$

DIFF. OF CUBES

$b^3 \underset{+}{-} c^3$

$= (b \underset{\underset{S}{+}}{-} c)(b^2 \underset{\underset{O}{-}}{+} bc \underset{\underset{AP}{+}}{+} c^2)$

f) $\lim_{x\to 0}\frac{(x+8)^{\frac{1}{3}}-2}{x}$

let $a = (x+8)^{1/3}$

$a^3 = x+8$

$x = a^3-8$

$= \lim_{a\to 2}\frac{a-2}{a^3-8}$

$= \lim_{a\to 2}\frac{\cancel{a-2}}{\cancel{(a-2)}(a^2+2a+4)}$

$= \frac{1}{12}$

In Summary:

To help evaluate limits we can

- substitute directly (as we did in a)
- factor (as we did in b & e)
- rationalize (as we did in c)
- use one-sided limits (as we did in d & e)
- use a change of variable (as we did in f)

Assigned Work:

p.45 #4, 7, 8, 9