Math 1A Quiz 1 Version 3 No Calculator **NAME YOU [...] CLASS:**
Fri Apr 20, 2018

↙ GREENSHEET PORTION

SCORE: 23 **/ 30 POINTS** 16 + 6 + 1 ← CALCULATOR PORTION

1. No calculators allowed on this part
2. Unless stated otherwise, you must simplify all final answers
3. Show proper calculus level work to justify your answers

Evaluate the following limits. Write "DNE" if a limit does not exist. **SCORE:** 8 **/ 11 PTS**

You do not need to show the use of the limit laws. However, it must be clear how you got your answers.

[a] $\lim_{x \to 3} \frac{x^3 - 6x + 9}{x^2 + 2x - 3}$

$= \frac{3^3 - 6 \times 3 + 9}{3^2 + 2 \times 3 - 3}$

$= \frac{27 - 18 + 9}{9 + 6 - 3}$

$= \boxed{\frac{18}{12}}$ $\frac{1}{2}$

$= \boxed{\frac{3}{2}}$ $\frac{1}{2}$

[b] $\lim_{x \to -4} f(x)$ if $f(x) = \begin{cases} \sqrt[3]{x-4}, & \text{if } x < -4 \\ 0, & \text{if } x = -4 \\ \frac{x}{x+6}, & \text{if } x > -4 \end{cases}$

1

$\lim_{x \to -4^-} f(x) = \boxed{\lim_{x \to -4^-} \sqrt[3]{x-4}} = \sqrt[3]{-4-4} = \sqrt[3]{8} =$

$\lim_{x \to -4^+} f(x) = \boxed{\lim_{x \to -4^+} \frac{x}{x+6}} = \frac{-4}{-4+6} = \frac{-4}{2} = -2$

$\lim_{x \to -4^-} f(x) = \lim_{x \to -4^+} f(x)$ 1

$\lim_{x \to -4} f(x) = -2$ 1

[c] $\lim_{x \to 5} \frac{x - 5}{3 - \sqrt{2x - 1}}$ $= \frac{0}{0}$

$= \lim_{x \to 5} \left(\frac{x-5}{3 - \sqrt{2x-1}} \times \frac{3 + \sqrt{2x-1}}{3 + \sqrt{2x-1}} \right)$

$= \lim_{x \to 5} \frac{(x-5)(3 + \sqrt{2x-1})}{9 - (2x-1)}$

$= \lim_{x \to 5} \frac{\cancel{(x-5)}(3 + \sqrt{2x-1})}{-2\cancel{(x-5)}}$

$\boxed{= \lim_{x \to 5} \frac{3 + \sqrt{2x-1}}{-2}}$ 1

$= \frac{3 + \sqrt{2 \times 5 - 1}}{-2}$

$= \frac{3 + 3}{-2}$ $\boxed{= -3}$ 1

[d] $\lim_{x \to -2} \frac{1 + \frac{2}{x}}{\frac{6}{4+x} - 3}$

$= \lim_{x \to -2} \left[\frac{x+2}{x} \div \frac{6 - 3(4+x)}{4+x} \right]$

$= \lim_{x \to -2} \left[\frac{\cancel{x+2}}{x} \times \frac{4+x}{-3\cancel{(x+2)}} \right]$

$\boxed{= \lim_{x \to -2} \frac{4+x}{-3x}}$ 1

$= \frac{4-2}{-3(-2)} = \frac{2}{6} = \boxed{\frac{1}{3}}$ 1

Prove that $\lim\limits_{x\to 0} x^4 \sin\dfrac{1}{x^2} = 0$.

SCORE: 4 / 4 PTS

$\boxed{-1 \le \sin\frac{1}{x^2} \le 1}$ ①

$\boxed{-x^4 \le x^4 \sin\frac{1}{x^2} \le x^4}$ ①

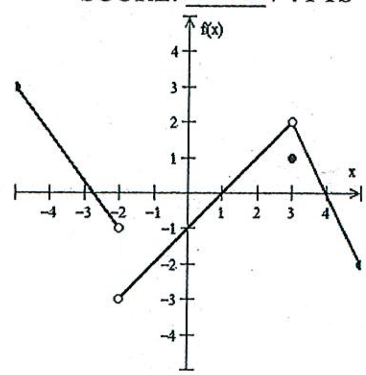
$\boxed{\lim\limits_{x\to 0} x^4 = 0 = \lim\limits_{x\to 0}(-x^4)}$ ①

by squeeze theroem $\frac{1}{2}$

$\lim\limits_{x\to 0} x^4 \sin\frac{1}{x^4} = 0$ $\frac{1}{2}$

The graph of f is shown on the right. Evaluate the following limits. Write "DNE" if a limit does not exist.

SCORE: $2\frac{1}{2}$ / 4 PTS



[a] $\lim\limits_{x\to 3} \dfrac{x}{5-4f(x)}$ ⬅ **Show the proper use of limit laws to find your anwer.**

$= \dfrac{\lim\limits_{x\to 3} x}{\lim\limits_{x\to 3} 5 - 4\lim\limits_{x\to 3} f(x)}$

$= \dfrac{3}{5-4\times\boxed{2}}$ ①

$= \dfrac{3}{5-8}$

$= \dfrac{3}{-3} = \boxed{-1}$ $\frac{1}{2}$

[b] $\lim\limits_{x\to -2^+} f(x)$

$= \boxed{-3}$ ①

Sketch the graph of an example of a function that satisfies all the following conditions.

SCORE: $1\frac{1}{2}$ / 2 PTS

✗ The domain of the function is $[-5, 4) \cup (4, 5]$

$\lim\limits_{x\to -1^+} f(x) = 1$

$\lim\limits_{x\to -1^-} f(x) = -4$

$\lim\limits_{x\to 4} f(x) = \infty$

f(-1)?