Math 1A Quiz 1 Version 3 No Calculator
Fri Apr 20, 2018

NAME YOU AS [redacted] **CLASS:**

SCORE: _____ / 30 POINTS $+5+3$ ← CALCULATOR PORTION

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

SCORE: _____ / 11 PT

[a] $\lim\limits_{x \to 3} \dfrac{x^3 - 6x + 9}{x^2 + 2x - 3}$

$= \lim\limits_{x \to 3} \dfrac{27 - 18 + 9}{9 + 6 - 3}$

$\boxed{\lim\limits_{x \to 3} \dfrac{18}{12}}$ (*)

$\boxed{= \lim\limits_{x \to 3} \dfrac{3}{2}}$ (*)

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

Since $\boxed{\lim\limits_{x \to -4^-} \sqrt[3]{x-4} = -2}$

and $\boxed{\lim\limits_{x \to -4^+} \dfrac{x}{x+6} = -2}$

then $\boxed{\lim\limits_{x \to -4} f(x) = -2}$

[c] $\lim\limits_{x \to 5} \dfrac{x - 5}{3 - \sqrt{2x - 1}}$

$= \lim\limits_{x \to 5} \dfrac{(x-5)(3+\sqrt{2x-1})}{9-(2x-1)}$

$= \boxed{\lim\limits_{x \to 5} \dfrac{-(5-x)(3+\sqrt{2x-1})}{5(5-x)}}$ (*)

$= \boxed{\lim\limits_{x \to 5} \dfrac{-(3+\sqrt{2x-1})}{5}}$ (*)

$= 0$

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

$= \lim\limits_{x \to -2} \dfrac{(1+\frac{2}{x})[x(4+x)]}{(\frac{6}{4+x}-3)[(4+x)x]}$

$= \lim\limits_{x \to -2} \dfrac{x(4+x) + 2(4+x)}{6x - 3x(4+x)}$

$= \boxed{\lim\limits_{x \to -2} \dfrac{(x+2)(4+x)}{-3x(2+x)}}$ ($1\frac{1}{2}$)

$= \boxed{\lim\limits_{x \to -2} \dfrac{4+x}{-3x}}$ (1)

$= \lim\limits_{x \to -2} \dfrac{2}{6} = \boxed{\lim\limits_{x \to -2} \dfrac{1}{3}}$ (*)

Prove that $\lim_{x \to 0} x^4 \sin \frac{1}{x^2} = 0$. SCORE: ______ / 4 PTS

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

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

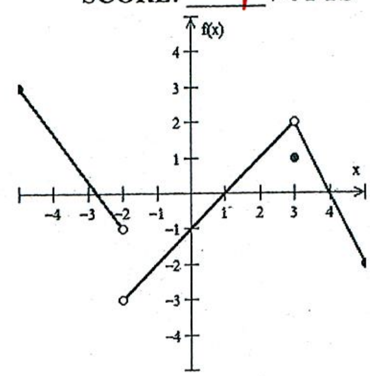
$g(x) = -x^4 \quad h(x) = \sin\frac{1}{x^2} x^4 \quad f(x) = x^4$

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

Since $\lim_{x \to 0} g(x) = \lim_{x \to 0} f(x) = 0$ *

then $\lim_{x \to 0} x^4 \sin\frac{1}{x^2} = \lim_{x \to 0} h(x) = 0$ $\frac{1}{2}$

The graph of f is shown on the right. Evaluate the following limits. Write "DNE" if a limit does not exist. SCORE: 4 / 4 PTS



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

$$= \boxed{\frac{\lim_{x \to 3} x}{\lim_{x \to 3} 5 - 4 \lim_{x \to 3} f(x)}} \quad 1\tfrac{1}{2}$$

$$= \frac{3}{5 - 4 \times \boxed{2}} \quad 1$$

$$= \frac{3}{-3} = \boxed{-1} \quad \tfrac{1}{2}$$

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

$= \boxed{-3}$ 1

Sketch the graph of an example of a function that satisfies all the following conditions. SCORE: 2 / 2 PTS

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

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

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

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