Math 1A (9:30am – 10:20am)
Group Quiz 3
Tue Jan 26, 2009

Group Members' Names: _____
[**Use the name you asked to** _____
be called] _____
_____

SCORE: ___ / 10 POINTS

Find all discontinuities for the following function. Determine whether each discontinuity is removable, jump or infinite. Show proper algebraic work and write using proper notation as shown in class.   **SCORE: ___ / 4 POINTS**

$$f(x) = \begin{cases} 3x+1 & \text{if } x < -2 \\ 1-2x^{-1} & \text{if } -2 < x < 1 \\ 4x-5 & \text{if } x \geq 1 \end{cases}$$

NOTE: x = 1 IS NOT A DISCONTINUITY SINCE $\lim\limits_{x \to 1} f(x) = f(1) = -1$

$\lim\limits_{x \to -2^-} f(x) = \lim\limits_{x \to -2^-} (3x+1) = -5$

$\lim\limits_{x \to -2^+} f(x) = \lim\limits_{x \to -2^+} (1-2x^{-1}) = 2$

$\lim\limits_{x \to -2^-} f(x) \neq \lim\limits_{x \to -2^+} f(x)$ ALTHOUGH BOTH EXIST

SO, x = -2 IS A JUMP DISCONTINUITY

$\lim\limits_{x \to 0^-} f(x) = \lim\limits_{x \to 0^-} (1-2x^{-1}) = \lim\limits_{x \to 0^-} \frac{x-2}{x}$

AS $x \to 0^-$, $x - 2 \to -2$ $\quad x \to 0^-$

SO, $\frac{x-2}{x} \to \infty$

SO, x = 0 IS AN INFINITE DISCONTINUITY

Find all asymptotes for the following function. For each vertical asymptote, determine both one-sided limits. Show proper algebraic work and write using proper notation as shown in class.   **SCORE: ___ / 3 POINTS**

$$f(x) = \frac{11 - 7(0.2^x)}{17(0.2^x) + 13}$$

SEE OTHER KEY

Prove that the equation $e^x = x^2$ has a solution in the interval $[-1, 1]$. Show proper justification.   **SCORE: ___ / 3 POINTS**

LET $f(x) = e^x - x^2$

SINCE e^x AND x^2 ARE CONTINUOUS, SO IS $e^x - x^2$

$f(-1) = e^{-1} - 1 = \frac{1}{e} - 1 < 0$

$f(1) = e - 1 > 0$

$f(-1) < 0 < f(1)$

BY IVT, THERE IS A VALUE $c \in (-1, 1)$ SUCH THAT $e^c - c^2 = 0$

IE. $e^c = c^2$