Quiz 2 (25 mins), MA1501 Calculus I, 09/03/2013a PRINTED NAME: _____GT ID:_____

This quiz is worth a total of 100 points, and the value of each question is listed with each question.
You must show your work; answers without substantiation do not count.

Answers must appear in the box provided! No cheat!

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1. (40 points) Evaluate

$$\lim_{t\to -1}\frac{t^2+3t+2}{t^2-t-2}$$

Answer:

$$\lim_{t\to -1}\frac{t^2+3t+2}{t^2-t-2}=\lim_{t\to -1}\frac{(t+1)(t+2)}{(t+1)(t-2)}=\lim_{t\to -1}\frac{(t+2)}{(t-2)}=-\frac{1}{3}$$

2. (20 points) The statement $\lim_{x\to x_0} f(x)=L$ means (using ϵ and δ):

Answer: For every $\epsilon>0$, there exists $\delta>0$ such that

$$0<|x-x_0|<\delta \implies |f(x)-L|<\epsilon.$$

(40 points) Use your answer to show that

$$\lim_{x\to 2}(5x-1)=9.$$

Answer: For any given $\epsilon>0$, we need to find $\delta>0$ such that

$$0<|x-2|<\delta \implies |(5x-1)-9|<\epsilon.$$

We find δ by working

$$\begin{aligned} |(5x-1)-9| &= |5x-10|<\epsilon \\ & 5|x-2|<\epsilon \\ & |x-2|<\epsilon/5. \end{aligned}$$

Thus, we can take $\delta=\epsilon/5$ (or smaller, e.g., $\epsilon/6$, $\epsilon/7$, $\cdots$)