235 Quiz 2

September 20, 2012

Name: _____

Name: * key. *

Name: _____

You have 30 minutes to complete this quiz, and you may work in groups of up to three. You must work together on each problem as a group; do not split up problems.

You may use your Notebooks according to the guidelines. When you are finished you may leave or you can stay to ask questions. Please do not talk after your quiz is completed.

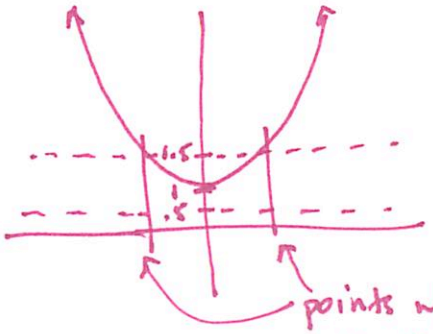
1. Consider the limit $\lim_{x\to 0}(3x^2+1) = 1$.

a) Find the largest value of δ that is compatible with the distance $\epsilon = 0.5$ in the definition of this limit statement. (Leave your answer exact; no calculators.)

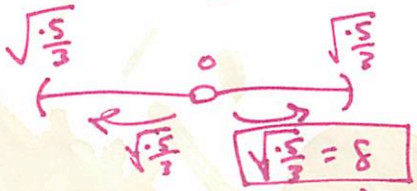
for all $\epsilon > 0$, there exists $\delta > 0$
such that if $x \in (0-\delta, 0+\delta)$, then $3x^2+1 \in (1-\epsilon, 1+\epsilon)$

find δ

$(.5, 1.5)$ given $\epsilon = .5$



points where $3x^2+1 = 1.5$ are: $3x^2 = .5 \Rightarrow x^2 = \frac{.5}{3} \Rightarrow x = \pm\sqrt{\frac{.5}{3}}$



(i.e. $\frac{1}{\sqrt{6}}$)

answer

b) Write a formal delta-epsilon proof of the limit statement.

proof. given any $\epsilon > 0$, choose $\delta = \sqrt{\epsilon/3}$.

if $0 < |x-0| < \delta$,

then we have

$$|(3x^2+1)-1| = |3x^2| = 3|x|^2 < 3\delta^2 = 3\left(\sqrt{\epsilon/3}\right)^2 = \epsilon. \quad \square$$

choose δ so that $3\delta^2 = \epsilon \Rightarrow \delta^2 = \frac{\epsilon}{3} \Rightarrow \delta = \sqrt{\epsilon/3}$

coffee! ∴