M E T U
Northern Cyprus Campus

	Calculus with Analytic Geometry **Short Exam 1A**	
Code : *Math 119* Acad.Year: *2013-2014* Semester : *Spring* Date : *19.03.2013* Time : *17:45* Duration : *35 minutes*	Last Name: Name: KEY Student No: Signature:	
	4 QUESTIONS 2 PAGES TOTAL 21 POINTS	

1(4)	2(4)	3(9)	4(4)			

Show your work! No calculators! Please draw a box around your answers!
Please do not write on your desk!

1. ($2 \times 2 = 4$ pts.) Evaluate the limit, if it exists. **Give reasoning**.

(a) $\lim_{x\to 1} \dfrac{x^2+2x}{x^2-4} = \dfrac{\lim_{x\to 1} x^2+2x}{\lim_{x\to 1} x^2-4} = \dfrac{3}{-3} = -1$ (continuity)

$\left(\lim_{x\to 1} x^2-4 = -3 \neq 0\right)$

(b) $\lim_{x\to 1} \dfrac{|x^3+x^2-5x+3|}{x-1} = \lim_{x\to 1} \dfrac{|(x-1)^2|\,|x+3|}{x-1} = \lim_{x\to 1} \dfrac{(x-1)^2|x+3|}{x-1}$

$= \lim_{x\to 1} (x-1)|x+3| = 0$ (continuity)

2. (4 pts.) Write an equation of the tangent line to the curve $y = \dfrac{2sin(x)+3}{x^2+1}$ at $x = 0$.

at $x=0$, $y=3$

$$y' = \frac{2\cos x\,(x^2+1) - 2x\,(2\sin x + 3)}{(x^2+1)^2}$$

$x=0 \Rightarrow y' = 2$

eqn of tangent line is

$$y-3 = 2(x-0) \iff \boxed{y = 2x+3}$$

3. $(9 \times 1 = 9$ pts.) Determine whether the given statement is true or false.
Indicate your answers by typing **TRUE** or **FALSE**. No explanations required.

(a) If f is continuous at a then it is differentiable at a.
FALSE

(b) If $\lim_{x\to a} f(x) = 0$ and $\lim_{x\to a} g(x) = 0$, then $\lim_{x\to a} \dfrac{f(x)}{g(x)}$ does not exist.
FALSE

(c) If $\lim_{x\to a} f(x)g(x)$ exists then $\lim_{x\to a} f(x)g(x) = f(a)g(a)$.
FALSE

(d) If f is differentiable at a then it has a limit at a.
TRUE

(e) $|x^2 + 2|$ is differentiable everywhere.
TRUE

(f) $\lim_{x\to 1} \dfrac{x^2 + 2x - 2}{x^2 + 8x - 7} = \dfrac{\lim_{x\to 1} x^2 + 2x - 2}{\lim_{x\to 1} x^2 + 8x - 7}$
TRUE

(g) $\lim_{x\to 0} \dfrac{1}{x} = +\infty$
FALSE

(h) $\dfrac{x^2 - 1}{x - 1} = x + 1$
FALSE

(i) $\lim_{x\to 2} \dfrac{x^2 - 1}{x - 1} = \lim_{x\to 2} x + 1$
TRUE

4. $(2 + 2 = 4$ pts.) Consider the following items.
(1) $\epsilon > 0$ (2) $\delta > 0$ (3) $0 < |x - c| < \delta$ (4) $|f(x) - L| < \epsilon$ (5) $|f(x) - L| > \epsilon$ (6) but
(7) such that (8) for all (9) there is some (10) there is some x (11) whenever

(a) Write the numerical sequence for the definition of $\lim_{x\to c} f(x) = L$.
8 - 1 - 9 - 2 - 7 - 4 - 11 - 3

(b) Write the numerical sequence to form a rigorous assertion that $\lim_{x\to c} f(x) \neq L$.
9 - 1 - 7 - 8 - 2 - 10 - 7 - 3 - 6 - 5