M E T U
Northern Cyprus Campus

	Calculus with Analytic Geometry Short Exam 1	
Code : *Math 119* Acad.Year : *2015-2016* Semester : *Fall* Date : *04.11.2015* Time : *18:50* Duration : *25 minutes*	Last Name: Name: KEY Signature:	List No: Student No:
	5 QUESTIONS 2 PAGES TOTAL 20 + 2 BONUS POINTS	

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Show your work! No calculators! Please draw a $\boxed{\text{box}}$ around your answers!
Please do not write on your desk!

1. ($8 \times 1 = 8$ pts.) Indicate whether the given statement is **TRUE** or **FALSE** by circling your answer. No explanations required.

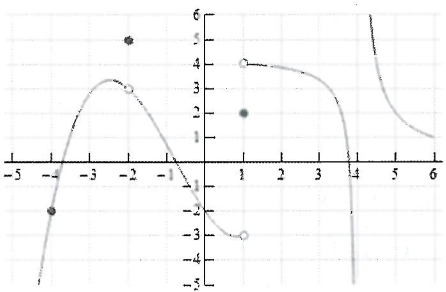
   (a) **TRUE** / **FALSE** If $f(1) > 0$ and $f(3) < 0$, then there exists a number $c \in (1,3)$ such that $f(c) = 0$.

   (b) **TRUE** / **FALSE** $\lim_{x \to -3} [\![x]\!] - [\![-x]\!] = -7$

   (c) **TRUE** / **FALSE** $\dfrac{x^2 - 6x + 9}{x - 3} = x - 3$.

   (d) **TRUE** / **FALSE** If f is continuous at a, then f is differentiable at a.

   The following statements are related to the given graph.



   (e) **TRUE** / **FALSE** $\lim_{x \to -2} f(x) = 3$.

   (f) **TRUE** / **FALSE** $\lim_{x \to 1} f(x) = 2$.

   (g) **TRUE** / **FALSE** $\lim_{x \to 1^+} f(x)$ does not exist.

   (h) **TRUE** / **FALSE** $\lim_{x \to 4^-} f(x)$ does not exist.

2. (2 pt.) Evaluate the given limit, if possible. If the limit does not exist, explain. *(no partial credits)*.

$$\lim_{x \to 2} |x - 2|$$

$\lim_{x \to 2^+} |x-2| = \lim_{x \to 2^+} x - 2 = 0$; $\lim_{x \to 2^-} |x-2| = \lim_{x \to 2^-} -(x-2) = 0$

Since $\lim_{x \to 2^+} |x-2| = \lim_{x \to 2^-} |x-2| = 0$,

$\lim_{x \to 2} |x-2| = 0$

3. (4 pts.) Evaluate the given limit, if possible. If the limit doesn't exist, explain.

DO NOT USE L'HOSPITAL'S RULE

$$\lim_{x\to 3}\frac{x^2-9}{\sqrt{2x-3}-\sqrt{3}} = \lim_{x\to 3}\frac{x^2-9}{\sqrt{2x-3}-\sqrt{3}}\cdot\frac{\sqrt{2x-3}+\sqrt{3}}{\sqrt{2x-3}+\sqrt{3}}$$

$$= \lim_{x\to 3}\frac{(x^2-9)(\sqrt{2x-3}+\sqrt{3})}{2x-3-3} = \lim_{x\to 3}\frac{\cancel{(x-3)}(x+3)(\sqrt{2x-3}+\sqrt{3})}{2\cancel{(x-3)}}$$

$$= \frac{1}{2}\cdot 6(\sqrt{3}+\sqrt{3}) = 6\sqrt{3}$$

4. (4 pts.) Find the derivative of $f(x) = (\sqrt{x} + x\tan x)\cos x$.

Using the product rule,

$$f'(x) = \left(\frac{1}{2\sqrt{x}} + \tan x + x\sec^2 x\right)\cos x$$
$$+ (\sqrt{x} + x\tan x)(-\sin x)$$

5. (4 pts.) Find an equation of the tangent line to the the graph of $y = f(x) = \dfrac{x+2}{1+\sec x}$ at $x = 0$.

Using the quotient rule,

$$f'(x) = \frac{1(1+\sec x) - (x+2)(\sec x\tan x)}{(1+\sec x)^2}$$

$$f'(0) = \frac{2}{4} = \frac{1}{2} \quad ; \quad f(0) = \frac{2}{2} = 1.$$

Hence the tangent line has the equation

$y - 1 = \frac{1}{2}(x-0)$, or $y = \frac{1}{2}x + 1$