M E T U
Northern Cyprus Campus

	Calculus with Analytic Geometry **Short Exam 2**	
Code : *Math 119* Acad.Year: *2013-2014* Semester : *Summer* Date : *15.07.2014* Time : *18:00* Duration : *30 minutes*	Last Name: Name: Student No: Signature: 3 QUESTIONS 2 PAGES TOTAL 20 POINTS	
1(8) 2(6) 3(6)		

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

1. (8 pts.) Find the following derivatives. **DO NOT SIMPLIFY YOUR ANSWERS.**

(a) $\left(\sqrt[4]{x^3}+\frac{1}{\sqrt[3]{x^4}}\right)' = \left(x^{3/4} + x^{-4/3} \right)'$

$= \frac{3}{4} x^{3/4-1} + \left(-\frac{4}{3}\right) x^{-4/3-1} = \frac{3}{4} x^{-1/4} - \frac{4}{3} x^{-7/3}$

(b) $\left(\frac{2x^3+5}{x^2+3x}\right)' = \frac{6x^2(x^2+3x) - (2x^3+5)(2x+3)}{(x^2+3x)^2}$

(c) $\left(\cos(2x)\sec(x^2+1)\right)' = (\cos 2x)' \sec(x^2+1) + \cos 2x \left(\sec(x^2+1)\right)'$

$= -\sin(2x) \cdot 2 \cdot \sec(x^2+1) + \cos 2x \sec(x^2+1) \tan(x^2+1) \cdot (2x)$

(d) $\left(\frac{1}{119}(15x+7)^{2014}\right)' = \frac{1}{119} 2014 (15x+7)^{2013} \cdot (15)$

2. (6 pts.) Find the tangent line to the graph of $x^2y + xy^2 = 2x$ at the point $(1, 1)$.

By implicit differention, we have

$$2xy + x^2\frac{dy}{dx} + y^2 + x2y\frac{dy}{dx} = 2$$

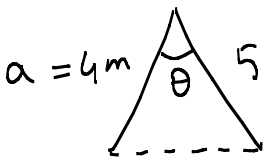
at $(1,1)$, $\quad 2 + \frac{dy}{dx}\Big|_{(1,1)} + 1 + 2\frac{dy}{dx}\Big|_{(1,1)} = 2$

$$\Rightarrow \frac{dy}{dx}\Big|_{(1,1)} = -\frac{1}{3}$$

So the eqn of tangent line is

$$y - 1 = -\frac{1}{3}(x-1) \quad \text{or equivalently,} \quad y = -\frac{1}{3}x + \frac{4}{3}$$

3. (6 pts.) Two sides of a triangle are 4 m and 5 m in length and the angle between them is increasing at a rate of $0,06$ rad/s. Find the rate at which the area of the triangle is increasing when the angle between the sides of fixed length is $\pi/3$.



$$\frac{d\theta}{dt} = 0,06 \text{ rad/s}$$

$$\text{Area} = A = \frac{1}{2}\sin\theta \; a.b. = 10\sin\theta$$

$$\frac{dA}{dt}\Big|_{\theta=\frac{\pi}{3}} = ?$$

$$A = 10\sin\theta \Rightarrow \frac{dA}{dt} = 10\cos\theta\frac{d\theta}{dt}$$

$$\theta = \frac{\pi}{3} \Rightarrow \frac{dA}{dt}\Big|_{\theta=\frac{\pi}{3}} = 10\cos\left(\frac{\pi}{3}\right)\cdot(0,06) = 10\cdot\frac{1}{2}\cdot(0,06)$$

$$= \boxed{0,3 \text{ rad}^2/\text{s}}$$

DID YOU WRITE YOUR NAME AND ID NUMBER ON THE PAPER?