M E T U
Northern Cyprus Campus

	Calculus With Analytic Geometry Short Exam 4	
Code : *Math 119* Acad.Year : *2011-2012* Semester : *Summer* Date : *03.8.2012* Time : *16:40* Duration : *30 minutes*	Last Name: Name: Department: Student No: Section: Signature: Recitation:	
	2 QUESTIONS ON 2 PAGES TOTAL 50 POINTS	
1 | 2		

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

1. $(4 \times 6 = 24$ pts.) Calculate the following derivatives.

(a) $\dfrac{d}{dx}\left(\pi^{3x^2+5}\right) = \pi^{3x^2+5} \cdot \ln(\pi) \cdot (6x)$

(b) $\dfrac{d}{dx}\left(\log_3(3x+7)\right) = \dfrac{1}{\ln 3} \cdot \dfrac{1}{3x+7} \cdot 3$

(c) $\dfrac{d}{dx}\left(\arctan(x)^{\sin(x)}\right) = \arctan(x)^{\sin(x)}\left(\cos(x)\ln(\arctan(x)) + \dfrac{\sin(x)}{(1+x^2)\arctan(x)}\right)$

$y = \arctan(x)^{\sin(x)} \Rightarrow \ln(y) = \sin(x)\ln(\arctan(x))$

$\Rightarrow \dfrac{y'}{y} = \cos(x)\ln(\arctan(x)) + \sin(x) \cdot \dfrac{1}{\arctan x} \cdot \dfrac{1}{1+x^2}$

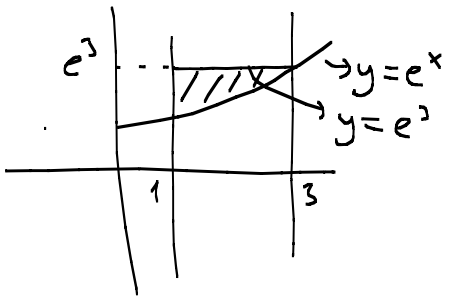
(d) $\dfrac{d}{dx}\left(\displaystyle\int_{\sqrt{x}}^{x^2} \arccos(y^2)\,dy\right) = \dfrac{d}{dx}\left(\displaystyle\int_a^{x^2} \arccos(y^2)\,dy - \int_a^{\sqrt{x}} \arccos(y^2)\,dy\right)$

$= \arccos((x^2)^2) \cdot 2x - \arccos((\sqrt{x})^2) \cdot \dfrac{1}{2\sqrt{x}}$

$= \arccos(x^4) \cdot 2x - \arccos(x) \cdot \dfrac{1}{2\sqrt{x}}$

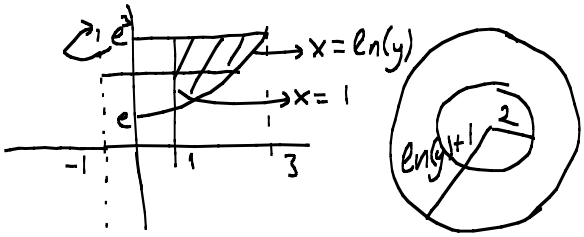
2. Let R be the region in the first quadrant bounded by the curves $y = e^x$, $x = 1$, $x = 3$ and $y = e^3$. Let S be the solid obtained by rotating the region R about the line $x = -1$.

(a) (8 pts.) Find the area of the region R.



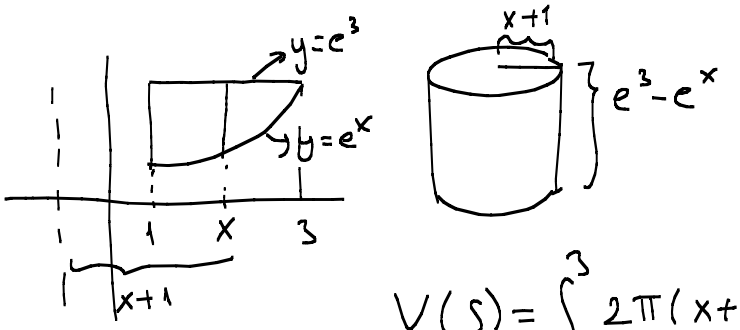
$$\text{Area of } R = \int_1^3 (e^3 - e^x)\,dx = e^3 x - e^x \Big|_1^3$$
$$= e^3(3-1) - (e^3 - e^1)$$
$$= e^3 + e$$

(b) (9 pts.) Write the integral for finding the volume of S using **the disk/washer method**.
DO NOT EVALUATE THIS INTEGRAL.



$$V(S) = \int_e^{e^3} \pi\left((\ln(y)+1)^2 - 2^2\right) dy$$

(c) (9 pts.)) Write the integral for finding the volume of S using **the shell method**.
DO NOT EVALUATE THIS INTEGRAL.



$$V(S) = \int_1^3 2\pi(x+1)(e^3 - e^x)\,dx$$