

M E T U

Northern Cyprus Campus

| | | | | | |
|--|---|------------------------|----------------------|-------------|--|
| Calculus with Analytic Geometry | | | Short Exam 3A | | |
| Code : <i>Math 119</i> | | Last Name: | | | |
| Acad. Year: <i>2013-2014</i> | | Name: | | Student No: | |
| Semester : <i>Spring</i> | | Signature: | | | |
| Date : <i>14.05.2014</i> | | 3 QUESTIONS ON 2 PAGES | | | |
| Time : <i>18:40</i> | | TOTAL 21 POINTS | | | |
| Duration : <i>25 minutes</i> | | | | | |
| 1 | 2 | 3 | | | |

Show your work! No calculators! Please draw a box around your answers!

Please do not write on your desk!

Papers without names will receive 0 credits!

1. ($2 \times 4 = 8$ pts.) Find the following indefinite integrals.

(a) $\int \sin(x) e^{\cos(x)} dx = - \int e^u du = -e^u + C$

$u = \cos(x)$

$du = -\sin x dx$

$-e^{\cos(x)} + C$

(b) $\int \frac{1}{\sqrt{1-9y^2}} dy = \frac{1}{3} \int \frac{du}{\sqrt{1-u^2}} = \frac{1}{3} \arcsin(u) + C$

$u = 3y$

$du = 3 dy$

$\frac{1}{3} \arcsin(3y) + C$

2. ($3 \times 3 = 9$ pts.) Calculate the following derivatives.

$$(a) \frac{d}{dx}(2^{\cos(x)}) = -2^{\cos(x)} \cdot \ln(2) \cdot \sin(x)$$

$$(b) \frac{d}{dx}(\ln(5x+4)) = \frac{1}{5x+4} \cdot 5$$

$$(c) \frac{d}{dx}(\tan(x)^{\arccos(x)})$$

$$y = \tan(x)^{\arccos(x)} \Rightarrow \ln y = \arccos(x) \ln(\tan x)$$

derivate both sides

$$\frac{y'}{y} = \frac{-1}{\sqrt{1-x^2}} \ln(\tan x) + \arccos(x) \frac{\sec^2(x)}{\tan(x)}$$

$$\Rightarrow y' = \tan(x)^{\arccos(x)} \left(\frac{-\ln(\tan x)}{\sqrt{1-x^2}} + \arccos(x) \frac{\sec^2(x)}{\tan x} \right)$$

3. (4 pts.) Suppose f^{-1} is the inverse of a differentiable function f , $f(3) = 7$ and that $f'(3) = 4$. Calculate $(f^{-1})'(7)$.

Methods that involve trying to find such an f will receive 0 credits.

$$f(f^{-1}(x)) = x \Rightarrow f'(f^{-1}(x)) \cdot (f^{-1})'(x) = 1$$

$$\Rightarrow (f^{-1})'(x) = \frac{1}{f'(f^{-1}(x))}$$

$$f(3) = 7 \Leftrightarrow f^{-1}(7) = 3$$

$$(f^{-1})'(7) = \frac{1}{f'(f^{-1}(7))} = \frac{1}{f'(3)} = \boxed{\frac{1}{4}}$$

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