UNIVERSITY OF JOHANNESBURG

FACULTY OF SCIENCE

DEPARTMENT OF PURE AND APPLIED MATHEMATICS

MODULE	**MAT1D01** ADVANCED BIO AND ENVIRO MATHS STATS
CAMPUS	**APK**
TEST	**SUPPLEMENTARY EXAM**
DATE	**05/12/2014**

PART A: CALCULUS

EXAMINER	MR. V. VAN APPEL
INTERNAL MODERATOR	MRS. C. DUNCAN
DURATION	1 HOUR
MARKS	35

SURNAME AND INITIALS _____

STUDENT NUMBER _____

CONTACT NUMBER _____

NUMBER OF PAGES:	6 + COVER PAGE
INSTRUCTIONS:	1. ANSWER ALL QUESTIONS ON THE PAPER IN PEN. 2. CALCULATORS ARE ALLOWED. 3. INDICATE **CLEARLY** ANY ADDITIONAL WORKING OUT.

1. Answer the following multiple choice questions and write your answer in the table provided below:

Question	Answer
1.1	
1.2	

1.1. The integral $\int e^x \cos(e^x)dx$ is: [4]

a) $\sin(e^x) + C$

b) $-\sin(e^x) + C$

c) $\cos(e^x) + C$

d) $-\cos(e^x) + C$

1.2. The $\lim\limits_{x \to 0} \frac{1 - \cos x}{x}$ is:

a) 0

b) undefined

c) 1

d) ∞

2. Find the derivative of the following functions

2.1. $f(x) = \cos\left(e^{\sqrt{\tan 3x}}\right)$

[3]

2.2. $y = x^{\sin x}$

[4]

3. Solve the following differential equation.

$$\frac{dy}{dx} = \frac{\ln x}{xy}$$

[4]

4. Evaluate the following integral

$$\int e^{\cos x} \sin x \, dx$$

[3]

5. Find the limit.

  5.1. $\displaystyle\lim_{x\to\infty} \frac{e^x}{x^2}$

[3]

  5.2. $\displaystyle\lim_{x\to\infty} x^{1/x}$

[4]

4

6. Find the volume of the solid obtained by rotating the region bounded by $y = x$ and $y = x^2$, about the x-axis

[5]

7. A rectangular package to be sent by a postal service can have a maximum combined length and girth (perimeter of a cross section) of 50cm. Find the dimensions of the package of maximum volume that can be sent.

[5]