



Mathematics 54
First Long Exam

M54-LE1-004
Elementary Analysis II
First Semester, AY 2013 -2014

I. Evaluate the following integrals.

[6 points each]

1. $\int \frac{dz}{z^2(z^2 + 4)}$

3. $\int_0^{\infty} \frac{x^2}{e^x} dx$

2. $\int \frac{\sqrt{x^2 - 2x}}{x - 1} dx$

4. $\int_0^1 \frac{dx}{\sqrt{1-x}}$

II. Determine the orthogonal trajectories of the family of curves $xy - cy = 1$, where c is a constant. [5 points]

III. Solve the initial value problem $(\cos 2y \cos 3y)dy + \sin^2 x dx = 0$, $y(\pi) = 0$. [6 points]

IV. A bacterial population is known to have a rate of growth proportional to itself. If the population triples after two days, after how many days will the population become 25 times its original size? [5 points]

- END OF EXAM -