UP SCHOOL OF STATISTICS STUDENT COUNCIL
Education and Research
EDUCATION AND RESEARCH
erho.weebly.com | erhomyhero@gmail.com | /erhoismyhero | @erhomyhero

M54_LE1_002
Mathematics 54 — Elementary Analysis II
First Long Exam — First Semester, AY 2014-2015

I. Solve the following indefinite integrals. (*5, 6, 6, 5 points*)

1. $\int \sin x(\cos(5x) + \sin^2 x)\, dx$
2. $\int \dfrac{dx}{(x^2-9)^{3/2}}$
3. $\int \dfrac{4x^2 - 3x + 7}{(x-2)(4x^2+1)}\, dx$
4. $\int \sin(2x)\, e^{\cos x}\, dx$

II. Evaluate the following improper integrals, if they converge. (*4 points each*)

1. $\int_{-2}^{1} \dfrac{x^2}{\sqrt{x^3+8}}\, dx$
2. $\int_{-\infty}^{+\infty} \dfrac{x^3}{1+x^4}\, dx$

III. Find the equation of the curve passing through $(0, \frac{3\pi}{4})$ if the slope of the tangent line at any point (x, y) on the curve equals $\cos^2 y \sin^2 x$. (*5 points*)

IV. Find the orthogonal trajectories of $y = \dfrac{k}{1+x^2}$, where $k \in \mathbb{R}$. (*5 points*)

Total: 40 points