UP SCHOOL OF STATISTICS STUDENT COUNCIL
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M54_LE1_001

Mathematics 54 — Elementary Analysis II
First Long Exam — First Semester, AY 2016-2017

General Instructions: This examination is good for **90 minutes** only. Show neat and necessary solutions and box all you final answers to gain full credit. Use **black or blue non-erasable ink** only. The use of electronic devices such as mobile phones or calculators is strictly prohibited. **Any form of cheating in examinations or any act of intellectual dishonesty in relation to studies, such as plagiarism, shall be subject to disciplinary action.**

I. Evaluate the following integrals. (*6 points each*)

1. $\int_{\frac{1}{2}}^{1} x^4 \ln(2x)\, dx$
2. $\int \sin^5(3x)\cos^2(3x)\, dx$
3. $\int \frac{1}{x^2\sqrt{x^2+4}}\, dx$
4. $\int \frac{3x^2+4x+4}{x(x^2+4)}\, dx$
5. $\int_{-\infty}^{0} \frac{e^{1/x}}{x^2} dx$

II. Find the equation of the curve that passes through the point $(1, \ln(2e+1))$ whose slope at any point (x,y) is given by

$$\frac{dy}{dx} = 2e^{x-y} \qquad (5 \text{ points})$$

III. Find the orthogonal trajectories for the family of sinusoids given by

$$y = k\sin(x), \quad k \in \mathbb{R}. \qquad (5 \text{ points})$$

- END OF EXAM -

Total: 40 points