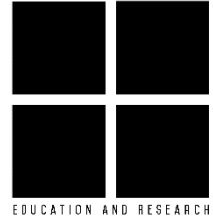




UP SCHOOL OF STATISTICS STUDENT COUNCIL  
*Education and Research*



erho.weebly.com | erhomyhero@gmail.com | /erhoismyhero | @erhomyhero

Mathematics 54  
First Long Exam

M54\_LE1\_002  
Elementary Analysis II  
First Semester, AY 2014-2015

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

1.  $\int \sin x (\cos(5x) + \sin^2 x) dx$

3.  $\int \frac{4x^2 - 3x + 7}{(x - 2)(4x^2 + 1)} dx$

2.  $\int \frac{dx}{(x^2 - 9)^{3/2}}$

4.  $\int \sin(2x) e^{\cos x} dx$

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

1.  $\int_{-2}^1 \frac{x^2}{\sqrt{x^3 + 8}} dx$

2.  $\int_{-\infty}^{+\infty} \frac{x^3}{1 + x^4} dx$

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  $y = \frac{k}{1 + x^2}$ , where  $k \in \mathbb{R}$ . (5 points)

**Total: 40 points**