M54-LE2-004
Mathematics 54 Elementary Analysis II
Second Long Exam First Semester, AY 2013 -2014

I. Determine the type of conic: write P for parabola, E for an ellipse and H for a hyperbola. *1 point each*

1. $3x^2-2y^2-6x-8y+5=0$
2. $2x^2+3y^2+8x-6y+5=0$
3. $r=\dfrac{3}{2+3\sin\theta}$
4. $r=\dfrac{12}{4+4\sin\theta}$
5. $r=\dfrac{1}{5-3\cos\theta}$

II. Given the equation: $16(x-5)^2-9y^2=144$. *3 points each*

1. Find the center, vertices and foci of the conic.
2. Sketch the graph and label all important points.
3. Find the polar equation of the conic.

III. Given the set of parametric equations C defined by: $C:\begin{cases}x=\ln(\cos t)\\ y=\sin t\end{cases}, t\in[0,\dfrac{\pi}{2})$

1. Find the corresponding Cartesian equation for C. *2 points*
2. Set-up the integral needed to find the length of arc of C when *t* runs from 0 to $\frac{\pi}{4}$. *3 points*
3. Find the second derivative when *t* = $\frac{\pi}{6}$. *4 points*

IV. Given the curves $r_1=2\cos 3\theta$ and $r_2=3-\sin\theta$.

1. Sketch the two curves together in one polar coordinate plane. *5 points*
2. Find the Cartesian equation of the tangent line at the point where $\theta=\frac{\pi}{2}$ of r_1. *4 points*

V. Given the graphs of the curves $r_1=3+2\sin\theta$ and $r_2=2$ below

1. Find all intersection points. *2 points*
2. Set-up the integral needed to find the perimeter of *R*. *3 points*
3. Set-up the integral that will determine the area of the region *R*. *3 points*

- E N D O F E X A M -