PHYS 301
HOMEWORK #10

Due : April 8, 2015

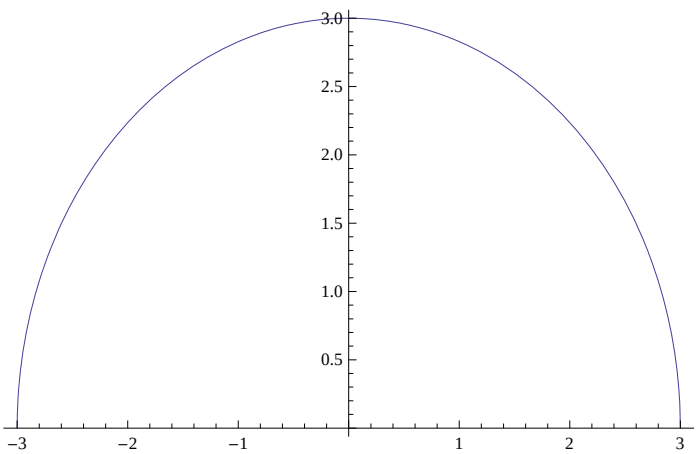
1. Consider the function :

$$\mathbf{F} = \{e^x \cos y,\ -e^x \sin y,\ 0\}$$

Find the line integral of this function over the contour defined by the upper half of the circle of radius 3, centered on the origin, in the xy plane. In other words, compute

$$\int_C \mathbf{F} \cdot d\mathbf{l}$$

over the contour



make sure you use only the upper half of this circle.

2, For what values of n does

$$V = r^n \cos\theta$$

satisfy Laplace' s equation in spherical polar coordinates?

Use series solutions techniques to find the recursion relations for the following differential equations, and write out the first three non - zero terms of the solution (and the first three non - zero terms of each branch if there are more than one branch).You may use Mathematica to verify solutions, but to receive credit you must submit your own solutions by hand.

3. $y''+y=0$

4. $y''+x\,y = 0$

5. $y''- x^2 y = 0$