

# PHYS 301

## HOMework #7

Due : 29 March 2017

1. Verify that  $\nabla \cdot \mathbf{r} = 3$  in spherical polar coordinates where  $\mathbf{r}$  is the position vector.
2. Find the values of  $n$  for which

$$V = c r^n$$

will satisfy Laplace's equation where  $c$  is a constant.

3 - 5 : Use series solution techniques to find the recursion relation and the first three non zero terms of all branches of the following differential equations :

3.  $y'' - x y' + 2 y = 0$

4.  $(x^2 + 4)y'' + xy' = x + 2$

5.  $y'' + (x - 1)y' + (2x - 3)y = 0$