PARTIAL DIFFERENTIAL EQUATIONS
SPRING 2015

ASSIGNMENT 10.1
DUE APRIL 2

**Exercise 1.** Show that if $\lambda = 0$, $a > 0$ and $m \geq 0$, then the only solution to the boundary value problem

$$r^2 R'' + rR' + (\lambda^2 r^2 - m^2)R = 0, \;\; R(0+) \text{ finite}, \;\; R(a) = 0$$

is $R \equiv 0$.

**Exercise 2.** Textbook exercise A.4.5

**Exercise 3.** Textbook exercise A.4.7

**Exercise 4.** Find the radius and interval of convergence of the power series

$$\sum_{n=1}^{\infty} \frac{n!\, x^n}{1 \cdot 3 \cdot 5 \cdot \cdots \cdot (2n-1)}.$$

**Exercise 5.** Find the radius of convergence of the power series

$$\sum_{n=0}^{\infty} \frac{(n!)^k}{(kn)!} x^n, \;\; k \in \mathbb{N}.$$

**Exercise 6.** Is it possible to find a power series whose interval of convergence is $[0, \infty)$? Explain.