1 Week 15 and Week 16 Participation Assignment (2 of 2)

1) Find a general formula for the coefficient a_n in a power series expansion about $x = 0$ for a general solution to the equation $(1-x^2)y''+xy'+3y = 0$.

$$(1-x^2)\sum_{n=0}^{\infty}(n)(n-1)a_nx^{n-2} + x\sum_{n=0}^{\infty}na_nx^{n-1} + 3\sum_{n=0}^{\infty}a_nx^n = 0$$

$$\sum_{n=0}^{\infty}(n+1)(n+2)a_{n+2}x^n - \sum_{n=2}^{\infty}n(n-1)a_nx^n + \sum_{n=1}^{\infty}na_nx^n + 3\sum_{n=0}^{\infty}a_nx^n = 0$$

$$(2a_2+3a_0) + 16a_3 + a_1 + 3a_1)x + \sum_{n=2}^{\infty}\left[(n+1)(n+2)a_n - n(n-1)a_n + na_n + 3a_n\right]x^n = 0$$

$$y(x) = c_0\left(\frac{3x^{2n}(2n -}{2n}\right.$$

2) Use the method of Frobenius to find at least first four non-zero terms in the series expansion about $x = 0$ for a solution to the equation $x^2y'' + (x^2+2x)y' - 2y = 0$ for $x > 0$.

$$x^2\sum_{n=0}^{\infty}(n+r)(n+r-1)a_nx^{n+r-2} + (x^2+2x)\sum_{n=0}^{\infty}(n+r)a_nx^{n+r-1} - 2\sum_{n=0}^{\infty}a_n\lambda^{n+r} = 0$$