POWER SERIES REVIEW PROBLEMS

1. **Convergence of power series:** For the following, find the radius of convergence:
   a) $\sum_{m=0}^{\infty} (m+1)mx^m$
   b) $\sum_{m=0}^{\infty} \frac{(-1)^m}{k^m} x^{2m}$
   c) $\sum_{m=0}^{\infty} \left(\frac{2}{3}\right)^m x^{2m}$

2. **Series solution of ODEs:** Solve the following using method of power series, and write the solution out to fifth order:
   a) $y'' - y' + xy = 0$
   b) $y'' + (1+x^2)y = 0$
   c) $y' + x^2 y = e^{-x}$

3. **Solve IVPs with Power Series:** Solve the following IVPs using power series. Write the solution up to the fifth order term.
   a) $y' + 4y = 1, \quad y(0) = 1.25$
   b) $y'' + 3xy' + 2y = 0, \quad y(0) = 1, \quad y'(0) = 1$
   c) $(x-2)y' = xy, \quad y(0) = 4$