M182 Group Worksheet: Taylor Series **Name:**_____

1. Find the radius and interval of convergence of the given power series (remember to check the endpoints!)

$$1 - 2x + 3x^2 - 4x^3 + 5x^4 - ... = \sum_{k=0}^{\infty} (-1)^k (k+1) x^k$$

2. Give the terms of order 3 or less for the power series of $e^x \sin(x)$ by multiplying the power series for e^x with the power series for $\sin(x)$. (Note: it works just like polynomial multiplication...)

3. Verify the formula $\cosh(x) = \dfrac{e^x + e^{-x}}{2}$. (Note: $\cosh x = \displaystyle\sum_{k=0}^{\infty} \frac{x^{2k}}{(2k)!}$).

4. Use power series to calculate the limit, and verify that l'Hopital's rule gives the same answer:

$$\lim_{x \to 0} \frac{e^x - 1}{x}$$