1. Find the radius of convergence for each power series below.

   (a) $\displaystyle\sum_{n=2}^{\infty} n^2 (z-3)^n$

   (b) $\displaystyle\sum_{n=4}^{\infty} e^n (z+i)^n$

2. What is the radius of convergence of the Taylor Series of $f(z) = \dfrac{1}{z^2 - 3z + 2}$ about $z = 0$? about $z = 3i$?

3. Find the Taylor Series of $f(z) = \dfrac{z}{1+z^2}$ about $z = 0$ and state the region of validity. Write your answer in summation form.

4. Find the Laurent Series of $f(z) = \dfrac{z}{1+z}$ about $z = 0$ in the region $1 < |z| < \infty$. Write your answer in summation form.

5. Determine all regions for which $f(z)$ has a Taylor Series expansion about $z = 2$. Then determine all regions for which $f(z)$ has a Laurent Series expansion about $z = 2$.

   DO NOT FIND THE SERIES EXPANSIONS!

   (a) $f(z) = e^z$

   (b) $f(z) = \dfrac{1}{z^2 + 1}$

   (c) $f(z) = \dfrac{1}{z(z+1)(z+2i)}$

6. Find the Laurent Series of $f(z) = \dfrac{1}{z^2 - 4}$ about $z = -1$ in the region $1 < |z+1| < 3$. It is not necessary to write your answer in summation form. However, you should write out sufficiently many terms so that the pattern is clear.