Math 132

Worksheet 11 – April 10, 2012

Name _____

1. Let $f(i)$ be a rational function (the ratio of two polynomials, e.g. $\frac{i^2+12}{i^3-3i+1}$). Explain in 1-3 sentences why the Ratio test will never help determine convergence of $\sum_{i=1}^{\infty} f(i)$.

   Hint: you might start by looking at some examples! What is the degree of the polynomials on top and bottom of the Ratio test limit?

2. Consider the power series $\sum_{i=1}^{\infty} \frac{i!}{i^i} \cdot x^i$.

   (a) If c_i is the coefficient of x^i, what is c_0? c_1? c_2?

   (b) Apply the ratio test and find the radius of convergence.

3. Using the geometric series formula and manipulation of power series, find a power series representation around 0 for the functions:

(a) $\dfrac{1}{1-x^4}$

For this series, give a formula for the coefficient c_i of x^i. (The formula will depend on whether i is a multiple of 4 or not, so you'll need braces.)

(b) $\dfrac{1}{2-x} = \dfrac{1}{2} \cdot \dfrac{1}{1-\frac{x}{2}}$

(c) $\dfrac{1}{1-x} - \dfrac{1}{2-x} = \dfrac{1}{x^2 - 3x + 2}$