Name: _____

Write all of your responses on the extra paper provided. Put your name at the top of all the pages. Show all your work, answers without supporting justification will not receive credit.

1. (*10 Points Each*) For each of the following series determine if the series is absolutely convergent, conditionally convergent, or divergent.

   (a) $\displaystyle\sum_{n=1}^{\infty} \frac{n^{2n}}{(1+n)^{3n}}$

   (b) $\displaystyle\sum_{n=1}^{\infty}(-1)^n \cos(1/n^2)$

   (c) $\displaystyle\sum_{n=1}^{\infty} \frac{5^n}{3^n + 4^n}$

2. (*10 Points*) Find the interval and radius of convergence of the following power series.

$$\sum_{n=1}^{\infty} \frac{(-1)^n}{(2n-1)2^n}(x-1)^n$$

3. (*10 Points*) Given that

$$\frac{1}{1-x} = 1 + x + x^2 + x^3 + \cdots = \sum_{n=0}^{\infty} x^n$$

   Find the power series for the following function as well as its radius of convergence.

$$f(x) = \frac{x}{(3-2x)^2}$$

4. **Extra Credit** (*5 Points*) Find the interval and radius of convergence of the following power series.

$$\sum_{n=1}^{\infty} \frac{n!x^n}{1 \cdot 3 \cdot 5 \cdots (2n-1)}$$