NAME(print in CAPITAL letters, first name first): _____

NAME(sign): _____

ID#: _____

Instructions: There are six problems. Make sure that you have all 6 problems.

Points received:

———————————

1 ———————————

2 ———————————

3 ———————————

4 ———————————

5 ———————————

6 ———————————

TOTAL ————

1. (24 points.) For each series below, if the series converges then find its sum; otherwise, state that it diverges.

(a) $\displaystyle\sum_{n=1}^{\infty} \left(\frac{1}{4}\right)^n$

(b) $\displaystyle\sum_{n=1}^{\infty} \left(\frac{5}{4}\right)^n$

(c) $\displaystyle\sum_{n=1}^{\infty} \frac{2^n + 3^n}{5^n}$

2. (24 points.) For each series below, state whether it converges or diverges.

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

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

3. (24 points.) For each series below, state whether it converges or diverges.

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

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

(c) $\displaystyle\sum_{n=1}^{\infty} \frac{\ln n}{n}$

(d) $\displaystyle\sum_{n=1}^{\infty} \frac{n^2 + (\ln n)^9}{n^4}$

4. (24 points.) For each series below, state whether it converges absolutely, converges condition-
   ally, or diverges

   (a) $\displaystyle\sum_{n=1}^{\infty}(-1)^n\frac{1}{\sqrt{n}+\ln n}$

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

   (c) $\displaystyle\sum_{n=1}^{\infty}(-1)^n\sqrt{\frac{n}{n+1}}$

   (d) $\displaystyle\sum_{n=2}^{\infty}(-1)^n\frac{n^8}{n^{10}+e^{-n}}$

5. (12 points.) Does the following series converge absolutely, converge conditionally, or diverge?

$$\sum_{n=1}^{\infty}(-1)^n\left(\sqrt{n+1}-\sqrt{n}\right)$$

6. (24 points.) Consider the power series

$$\sum_{n=1}^{\infty} \frac{n(x-2)^n}{5^n}.$$

(a) Find the interval of convergence.

(b) Find the radius of convergence.

(c) Find all values of x such that the series is conditionally convergent.