1. (8pts) Consider the sequence $\left\{ \dfrac{n}{n^2+10} \right\}_{n=1}^{\infty}$.

a) Show that this sequence is monotonic from some index on and bounded.

b) What can you say about the convergence of the sequence? If it converges, find the limit.

2. (4pts) Find the sum of the series:

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

3. (4pts) Which number is represented by the infinite repeating decimal number $0.97979797\ldots$?

4. (21pts) Determine whether each of the following series converges. State which test you used.

a) $\displaystyle\sum_{n=1}^{\infty} \frac{n-3}{n^4+n^2}$

b) $\displaystyle\sum_{n=0}^{\infty} \frac{n^4+3n^2+1}{5^{n+3}}$

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

d) $\sum_{n=1}^{\infty} \frac{\arctan n}{n^2+1}$

5. (6pts) Find the sum of the series $\sum_{n=1}^{\infty} \frac{1}{n^6}$ with accuracy 10^{-4}.

6. (7pts) Determine whether the series $\sum_{n=1}^{\infty}(-1)^{n-1}\frac{1}{1\cdot 3\cdot 5\cdot\cdots\cdot(2n-1)}$ converges absolutely, conditionally or diverges.

Bonus (5pts) Find two series $\sum a_n$ and $\sum b_n$ so that $\lim_{n\to\infty}\frac{a_n}{b_n}=0$, $\sum a_n$ converges and $\sum b_n$ diverges. (Hint: think easy known examples.) What is the significance of this example?