

YOUR NAME: _____

George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Determine whether the sequence (not series) converges or diverges. Full explanation required.

(a) $a_n = \frac{(n+1)!}{n!}$

(b) $a_n = \frac{(\ln n)^2}{n}$

2. Is the following series convergent or divergent? Full explanation required.

(a) $\sum_{n=1}^{\infty} 2^{2n} 5^{1-n}$

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

3. Determine whether the series $\sum_{n=1}^{\infty} \frac{n-1}{n4^n}$ converges or diverges. Full explanation required.

4. Apply the ratio test to the series $\sum_{n=1}^{\infty} \frac{(-3)^{n-1}}{\sqrt{n}}$ and state clearly the conclusion that you can draw. Show clearly all your steps.

5. Determine whether the series $\sum_{n=1}^{\infty} \left(\frac{n^2+1}{2n^2+1} \right)^n$ is absolutely convergent, conditionally convergent or divergent. Full explanation required.