SERIES - Extra Problems
3. Sections 11.2 – 11.4

1). Determine if the alternating series converges:

$$\frac{7}{4} - \frac{7}{6} + \frac{7}{8} - \frac{7}{10} + \frac{7}{12} - \dots$$

2). Determine if the alternating series converges:

$$\sum_{n=1}^{\infty} (-1)^{n-1} e^{\frac{3}{n}}$$

3). Determine if the series below is absolutely convergent or conditionally convergent or divergent:

$$\sum_{n=1}^{\infty} (-1)^{n-1} \frac{1}{4n-1}$$

For the following series, determine whether or not they converge:

4).

$$\sum_{n=1}^{\infty} \frac{n}{6^n}$$

5).

$$\sum_{n=1}^{\infty} \frac{n!}{10^n}$$

6).

$$\sum_{n=1}^{\infty} \frac{\sin(7n)}{5^n}$$

[Explain why you cannot use the Comparison Test for this series.]

7).

$$\sum_{n=1}^{\infty} \left(\frac{-4n}{n+1} \right)^{3n}$$

8).

$$\sum_{n=1}^{\infty} \left(\frac{n^3+3}{9n^3+1} \right)^{n}$$

9).

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

10).

$$\sum_{n=1}^{\infty} \left(\frac{3n+10}{3n+3} \right)^{4n+2}$$

11).

$$\sum_{n=1}^{\infty} \frac{3 \cdot 6 \cdot 9 \cdot 12 \cdot \ldots \cdot (3n)}{n!}$$

12).

$$a_1 = 3;\ a_{n+1} = \frac{6n^2+3}{5n^2+n} a_n$$

13). For what values of x does the series:

$$\sum_{n=1}^{\infty} \frac{x^n}{n!}$$

converge? What can you conclude about:

$$\lim_{n \to \infty} \frac{x^n}{n!}?$$

14).

$$\sum_{n=1}^{\infty} \frac{9^n}{4^n + 5^n}$$

15).

$$\sum_{n=1}^{\infty} \frac{n^{10} + 1}{8n^{11} + 7n^6 + 4}$$

16).

$$\sum_{n=1}^{\infty} \frac{4n!}{e^{n^2}}$$

17).

$$\sum_{n=1}^{\infty} \frac{3^n n^6}{n!}$$

18).

$$\sum_{n=1}^{\infty} \sin(8n)$$

19).

$$\sum_{n=1}^{\infty} \frac{(7n+1)^n}{n^{6n}}$$

20).

$$\sum_{n=1}^{\infty} \left(\sqrt[n]{6} - 1 \right)^n$$

21).

$$\sum_{n=1}^{\infty} \frac{\sin(8n)}{1 + 6^n}$$

22).

$$\sum_{n=1}^{\infty} \left(\frac{n}{n+1} \right)^{n^2}$$