1.) Find the sum of the following series.

a) $\sum_{n=1}^{\infty} e^{-n}$

b) $\sum_{n=0}^{\infty} \left[\left(\frac{1}{3}\right)^n + \left(-\frac{1}{4}\right)^n \right]$

2.) Determine whether the following positive series converge or diverge to $+\infty$. Be sure to justify your answer.

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

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

3.) Determine whether the following series converge absolutely, converge conditionally, or diverge. Be sure to justify your answer!

a.)

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

b.)

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

4.) For the function $f(x) = \arctan(x)$, find the first 4 terms of the Taylor Series for f centered at $c = 1$.

5.) Find the Maclaurin Series for

$$f(x) = \frac{1}{1-x^3}.$$

For what values of x does the resulting series converge? (HINT: You shouldn't need to use Taylor's Theorem to compute the coefficients!)

6.) Consider the power series

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

Determine for which values of x this series will converge. For these x values, is the convergence absolute or merely conditional?