

Name: _____

SS#: _____

1. Decide which of the following series converge and which diverge. Explain your answers by saying which test you are using. For the series that converge say whether the convergence is conditional or absolute.

a)
$$\sum_{n=1}^{\infty} \frac{\sin n}{n^2}$$

b)
$$\sum_{n=0}^{\infty} \frac{n!}{(2n+1)!}$$

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

d)
$$\sum_{n=1}^{\infty} \frac{(-1)^n}{n(\ln n)^{3/2}}$$

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

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

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

h)
$$\sum_{n=0}^{\infty} \frac{2n}{n + e^n}$$

i)
$$\sum_{n=1}^{\infty} \frac{n^2}{n^n}$$

2) Find the sum of the following two series

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

b) $\sum_{n=0}^{\infty} (-1)^{n+1} \frac{1}{2^n}$

3) Find the interval of convergence of the following power series. Make sure to check the endpoints.

a) $\sum_{n=1}^{\infty} \frac{x^{2n}}{2n^2 + 1}$

b) $\sum_{n=0}^{\infty} (-1)^n n^2 (x - 3)^n$

4) Suppose $f(x) = \sum_{n=0}^{\infty} 2^n \frac{(x-3)^{n+1}}{n+1}$ for $|x-3| < \frac{1}{2}$.

a) Find $f^{(4)}(3) =$

b) What is the series for $f'(x)$?

c) Find the actual formula for f' .

d) What is the formula for f ?

5) Find a polynomial that approximates $\cos x$ with an error less than .01 on the interval $[-1, 1]$.

6) Find the first four terms in the series for $f(x) = (1 + x)^{3/2}$ about $x = 0$.