172 Take Home Exam 2 Name: _____

1. Definition: A sequence $\{a_n\}$ has the limit L i.e. $\lim_{n\to\infty} a_n = L$ if

2. Definition: A series $\sum_{n=1}^{\infty} a_n$ converges to S if

3. Write the first 5 terms of the sequence defined by $a_1 = 3, a_{n+1} = 1 + \frac{2}{a_n}$

4. Assuming that the above sequence has a limit, find it.

5. Find the sum of the geometric series $\sum_{n=0}^{\infty} \frac{4^n}{5^{n+1}}$

6. Find the following sum: $\sum_{n=3}^{\infty} \frac{3}{(n-2)(n+1)}$

7. Use the comparison test to test
$\sum_{n=1}^{\infty} \frac{n}{\sqrt{n^3+3}}$
for convergence. State explicitly what you compared it to.

8. Determine whether the series
$\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n^3}}$
is conditionally convergent, absolutely convergent, or neither.

9. Use the ratio test to test $\sum_{n=1}^{\infty} \frac{3^n}{n!}$ for convergence.

10. Find the radius of convergence and the interval of convergence for

$$\sum_{n=1}^{\infty} \frac{(x-2)^n}{n3^n}$$

11. Find the Maclaurin series for
$f(x) = \dfrac{1}{(1-x)^2}$ and find the radius of convergence for that series.

12. Write the Maclaurin series for e^x

13. Write the Maclaurin series for $\sin(x)$

14. Write the Maclaurin series for $\cos(x)$

15. Write the Maclaurin series for x^3e^{-x}