

### Assignment 10-11

Determine whether each series is absolutely convergent, conditionally convergent, or divergent.

1.  $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2}$       2.  $\sum_{n=0}^{\infty} \frac{(-1)^n n^2}{n^3 - 4}$       3.  $\sum_{n=1}^{\infty} \frac{(-1)^n (n-1)}{n}$       4.  $\sum_{n=1}^{\infty} \frac{(\sin n)^3}{n^3}$

Determine the convergence or divergence of the series. Whenever possible, find the sum of the series.

5.  $\sum_{n=1}^{\infty} 5 \frac{2^n}{3^{n+2}}$       6.  $\sum_{n=2}^{\infty} \frac{(n+1)^2}{n \ln n}$       7.  $\sum_{n=0}^{\infty} 3 \left( \frac{\sqrt{5}}{2} \right)^n$       8.  $\sum_{n=0}^{\infty} \frac{3^n}{n!}$

9.  $\sum_{n=1}^{\infty} \frac{\sqrt{\ln n}}{n}$       10.  $\sum_{n=1}^{\infty} \frac{1}{\sqrt[5]{n^4}}$       11.  $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^3 + 3n}}$       12.  $\sum_{n=3}^{\infty} \frac{n+1}{n(n-2)}$

13.  $\sum_{n=0}^{\infty} \frac{1}{4^n - 3}$       14.  $\sum_{n=1}^{\infty} \frac{e^n}{n!}$       15.  $\sum_{n=1}^{\infty} \frac{3^n}{n^3}$       16.  $\sum_{n=0}^{\infty} \frac{(-1)^n 3^{2n+1}}{(2n+1)!}$

17.  $1 + \frac{1}{2} + \frac{1}{3!} + \frac{1}{4!} + \dots + \frac{1}{n!} + \dots$

18. Find a third degree Maclaurin Polynomial for  $f(x) = e^{-2x}$ .

19. Find a third degree Taylor Polynomial centered at  $c = \frac{-3\pi}{4}$  for  $f(x) = \tan x$ .

20. Use a Taylor Polynomial to approximate  $\sin(0.5)$  accurate to the third decimal place (error less than 0.001).

21. Use a Taylor Polynomial to approximate  $e^{-0.2}$  accurate to the third decimal place.

22. Find the largest possible value of  $|f(1.9) - p(1.9)|$  if  $p(x)$  is a second degree Taylor polynomial of  $f(x)$  centered at  $x=2$  and  $-9 \leq f'''(x) \leq 5$ .

23. Show four terms and a general term of a Taylor series centered at  $c = -1$  for the function  $g(x) = \frac{1}{x}$ .

24. Show four terms and a general term of a Taylor series centered at  $c = 0$  for the function  $f(x) = 2^x$ .

25. Show four terms of a Taylor series centered at  $c = 0$  for the function  $f(x) = \frac{1}{(x+1)^4}$ .

Find the interval of convergence for each series.

26.  $\sum_{n=0}^{\infty} \frac{(-1)^n (x-3)^n}{(n+1)^2}$       27.  $\sum_{n=0}^{\infty} \left( \frac{2x}{5} \right)^n$       28.  $\sum_{n=1}^{\infty} \frac{2^n (x-3)^n}{n}$       29.  $\sum_{n=0}^{\infty} n! (x-5)^n$

30. Find the series corresponding to the integral  $\int_0^x \frac{\sin t}{t} dt$ . Show four terms and a general term.