Sec 11.4 Review pg 1

Sec 11.4 Review pg 2

3 Use the Limit Comparison Test to test
$$\sum_{n=2}^{\infty} \frac{n}{\sqrt{n^8-6}}$$

for convergence/divergence.

Sec 11.4 Review pg 3

4 Using the <u>Limit Comparison Test</u>, determine if the series $\sum_{n=1}^{\infty} \frac{n^4 - 2n^2 + 3}{2n^6 - n + 5}$ converges.

(5) Is $\sum_{n=1}^{\infty} \frac{\sqrt{n+1}}{n}$ convergent or divergent?

 \bigcirc Test the series $\sum_{n=1}^{\infty} \frac{1}{2^n - 1}$ for convergence or divergence.

Determine whether the series
$$\sum_{n=1}^{\infty} \frac{2n^2 + 3n}{\sqrt{5 + n^5}}$$
 converges or diverges.

Memorize the statement of the Alternating Series Test pg 772

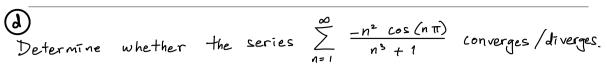
Determine if the following series converge or diverge, with justification.

(a)
$$\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n}$$
 (Copy solution from Example 1, pg 774)

(b)
$$\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n^2}{n^3+1}$$
 (Copy solution from Example **3**, pg 774)

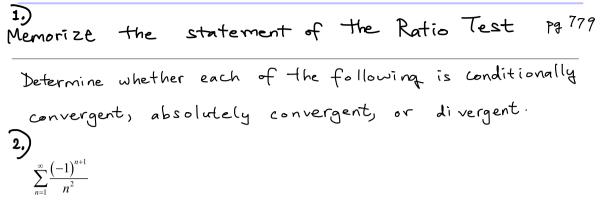
(c)
$$\sum_{n=1}^{\infty} (-1)^n \frac{3n}{4n-1}$$
 (Copy solution from Example 2, pg 774)

Sec 11.5 Review pg 2



$$\textcircled{O}$$
Determine whether the series $\sum_{n=1}^{\infty} \frac{\cos(n\pi)}{-n}$ converges/diverges.

Sec 11.6 Review pg 2





Sec II.6 Review pg 3

Determine whether each of the following is conditionally convergent, absolutely convergent, or divergent. $4 \sum_{n=1}^{\infty} \frac{\sin n}{n^2}$



WEBWORK PROBLEM 1, 2, 7, 8, 11, 12

Sec II.6 Review pg 4

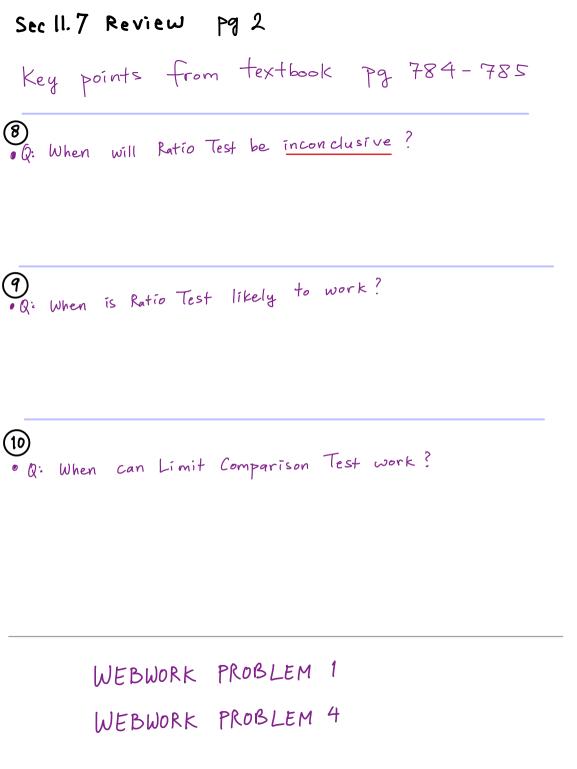
Determine whether each of the following is conditionally convergent, absolutely convergent, or divergent.

6.)
$$\sum_{n=1}^{\infty} (-1)^n \frac{n^3}{3^n}$$

7.)
$$\sum_{n=1}^{\infty} \frac{n^n}{n!}$$
.

Sec 11.7 Review pg 1

For each of the following series, determine whether the ratio test will work for testing Convergence / divergence. O The vatio test can be used $(1) \sum_{n=1}^{\infty} (1)^{n} \frac{(n n)}{(n^{2}+4)}$ O The ratio test will be inconclusive O The vatio test can be used O The ratio test will be inconclusive $(2) \quad \sum_{n=1}^{\infty} \quad \frac{\sqrt{n}+1}{n^5}$ O The vatio test can be used O The ratio test will be inconclusive $3 \qquad \sum_{n=1}^{\infty} \frac{\ell_n(\pi n) + 6\sqrt{n}}{n^2}$ O The vatio test can be used O The ratio test will be inconclusive $(4) \qquad \sum_{n=1}^{\infty} \frac{n!}{(n+1)!2}$ O The vatio test can be used O The ratio test will be inconclusive $\mathbf{\mathbf{5}} \quad \mathbf{\mathbf{5}}^{(-\underline{\mathbf{5}})^n} \underbrace{\mathbf{\mathbf{1}}_{n^2+4}}_{\mathbf{\mathbf{5}}^n} \mathbf{\mathbf{5}}^{(n^2+4)}$ O The vatio test can be used $\bigcirc \sum \frac{\sqrt{n+1}}{n!} C$ O The ratio test will be inconclusive O The vatio test can be used O The ratio test will be inconclusive



Sec 11.8 Review pg 1

Q'What theorem should you use to find the radius of convergence of a power series?

$$\begin{aligned} & \left| f \lim_{n \to \infty} \left| \frac{C_{n+1} \left(x - 10 \right)^{n+1}}{C_n \left(x - 10 \right)^n} \right| = \left| \frac{x - 10}{99} \right|, \text{ what is the radius of convergence for} \\ & \sum_{n=1}^{\infty} C_n \left(x - 10 \right)^n = C_1 \left(x - 10 \right) + C_2 \left(x - 10 \right)^2 + C_3 \left(x - 10 \right)^3 + \dots \end{aligned} \end{aligned}$$

WEBWORK PROBLEM 2, 6, 9, 10

Find the radius of convergence and interval of convergence for each series.

1.
$$\sum_{n=0}^{\infty} \frac{(x+2)^n}{5^n} = 1 + \frac{x+2}{5} + \frac{(x+2)^2}{25} + \dots$$



Sec 11.8 Review pg 3

3. Find the radius of Convergence and interval of convergence for $\sum_{n=1}^{\infty} \frac{5^n (x-4)^n}{\sqrt{n}}$

Find the radius of convergence and interval of convergence for each series.





Sec 11.8 Review pg 5

Suppose that $\sum_{n=0}^{\infty} c_n x^n$ converges when x = -3 and diverges when x = 4. Determine whether the following series converge or diverge.

1.
$$\sum_{n=1}^{\infty} c_n$$

$$2. \sum_{n=1}^{\infty} c_n 9^n$$

$$3. \sum_{n=1}^{\infty} c_n (-2)^n$$

4. $\sum_{n=1}^{\infty} (-1)^n c_n 12^n$

Sec 11.9 Review Pg |

Find a power series representation for $f(x) = \frac{5}{1+4x^2}$ and find its interval of convergence.

Find a power series representation for $f(x) = \frac{2x^4}{2-3x}$ and find its interval of convergence.

(3) Find a power series representation (centered at 0) for $f(x) = \frac{1}{(5+x)^2}$.

(a) Find the antiderivative of the power series

$$\frac{1}{1+x} = \sum_{n=0}^{\infty} (-1)^n x^n = 1 - x + x^2 - x^3 + \cdots \qquad \text{for} \qquad |x| < 1$$

So Find $\int \ln(1+t^4) dt$ as a power series, and find its radius of convergence.

Use the fact $\arctan(x) = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{2n+1}$ (with radius of convergence 1) to find a power series representation of $\int \frac{\arctan(2x)}{x} dx$. Find its radius of convergence.

The boxed equations are from Table 1, pg 808 (will be printed for you).

•
$$\ln(1-x) = -\sum_{n=1}^{\infty} \frac{x^n}{n} \quad \text{for } -1 \le x < 1.$$
(1)>
$$\sum_{n=1}^{\infty} \frac{1}{n 2^n} = .$$

$$2 \cdot \ln(1+x) =$$

for

Theorem (given for you) IF f has a power series representation at x = a, that is, if $f(x) = \sum_{n=0}^{\infty} c_n (x-a)^n \quad \text{for} \quad |x-a| < R,$ THEN its coefficients are given by $c_n = \frac{f^{(n)}(a)}{n!}.$ (3) If $f(x) = \sum_{n=0}^{\infty} C_n \times^n \text{ and } f(0) = 14, \quad f'(0) = -15, \quad f''(0) = -1, \quad f'''(0) = -1$, find the first four terms of $\sum_{n=0}^{\infty} C_n \times^n.$

$$9$$
 (From Textbook Example 1) If $f^{(n)}(a)=3^n$ for all $n \ge 0$,
what is the Taylor series of $f(x)$ centered at $x=a$?

(1) One of the Webwork problems is to find that

$$\ln(x) = \ln(10) + \sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{10^n n} (x-10)^n$$
when x is in the interval of convergence of the power series.

• Assume you have done the computation showing this equality. Find the interval of convergence of $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{10^n n} (x-10)^n$.

Table 1 $\frac{1}{1-x} = \sum_{n=0}^{\infty} x^n = 1 + x + x^2 + x^3 + \cdots$ R = 1Important Maclaurin Series and Their Radii of Convergence $e^{x} = \sum_{n=0}^{\infty} \frac{x^{n}}{n!} = 1 + \frac{x}{1!} + \frac{x^{2}}{2!} + \frac{x^{3}}{3!} + \cdots$ $R = \infty$ $\sin x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!} = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots$ $R = \infty$ $\cos x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!} = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \cdots$ $R = \infty$ Arc $\tan(x) = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{2n+1} = x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \cdots$ R = 1 $\ln(1+x) = \sum_{n=1}^{\infty} (-1)^{n-1} \frac{x^n}{n} = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots$ R = 1(i) Evaluate $\int \frac{1}{2X} dX$ (write as a "usual" elementary function) part (i) and Table 1 above to write $\int \frac{e^{qx}-1}{2x} dx$ as a power series



(14)

Use the table to write a power series representation of $\int \arctan(x^2) dx$ centered at X=0.



Use Table 1 to write $\int x^2 \sin(x^2) dx$ as a power series.



Use Table 1 to write $\int sin(x^4) dx$ as a power series centered at x = 0

Statements to memorize

I Alternating Series Test Sec 11.5 Statement:

Il Ratio Test Sec 11.6 Statement:

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O a geometric series converges Sec 11.2
when ...
O a geometric series diverges when ...
O a p-series series converges Sec 11.4
when ...
O a p-series series diverges when ...
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