LECTURE: CHAPTER 11 REVIEW (PART 1)

Section 11.1 - Sequences

The Big Question: How do you tell whether a *sequence* converges or diverges??

Example 1: Determine whether the sequence is convergent or divergent. If it is convergent find its limit.

(a) $a_n = \dfrac{2n^2+1}{3n^2+2}$

(b) $a_n = \dfrac{n}{n^2+1}$

Example 2: Determine whether the sequence is convergent or divergent. If it is convergent find its limit.

(a) $a_n = \dfrac{n}{\ln n}$

(b) $a_n = \dfrac{n^3}{n^2+1}$

Section 11.2 - Series

The Big Question: How do you tell if a *series* diverges?

The Next Big Question: Suppose you have a series $\sum a_n$. What if I tell you that $a_n \to 0$ but $s_n \to 5$, where s_n is the n-th partial sum. What can you say about the convergence/ divergence of $\sum a_n$?

Question: In this section you learned how to find the **exact** sum for two different types of series. What are these types and how do you find the sum?

Example 3: Find the sum of the series.

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

(b) $\displaystyle\sum_{n=1}^{\infty} (e^{1/n} - e^{1/(n+2)})$

Example 4: Determine whether $\displaystyle\sum_{n=1}^{\infty} \ln\left(\frac{n}{3n+1}\right)$ is convergent or divergent.

Section 11.3 - The Integral Test and p-Series

Example 5: Determine whether the series $\sum_{n=2}^{\infty} \frac{1}{n\sqrt{\ln n}}$ is convergent or divergent.

Example 6: Estimate $\sum_{n=1}^{\infty} \frac{1}{n^6}$ using s_5. What is the error in this estimate?

Section 11.4 - The Comparison Tests

Example 7: Determine whether $\sum_{n=1}^{\infty} \frac{n}{\sqrt{n^4+1}}$ the series is convergent of divergent.

Section 11.5 - Alternating Series

Example 8: Give an example of a series that is:

(a) conditionally convergent.

(b) absolutely convergent.

Example 9: Determine whether the series is convergent.

a) $\sum_{n=1}^{\infty} \frac{\cos(3n)}{1+(1.2)^n}$

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

Example 10: Find the sum of the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^5}$ correct to within 0.0001.

Section 11.6 - The Ratio and Root Tests

Example 11: Determine whether the series is convergent or divergent.

(a) $\displaystyle\sum_{n=1}^{\infty} \frac{(-5)^{2n}}{n^2 9^n}$

(b) $\displaystyle\sum_{n=1}^{\infty} \frac{1 \cdot 3 \cdot 5 \cdots (2n-1)}{5^n n!}$

Example 12: For what values of x does the series $\displaystyle\sum_{n=1}^{\infty} (\ln x)^n$ converge?

Suggested Problems: # 1-31 odds, 34, 35, 41, 43, 43, 47-51 odds, 55, 57