Worksheet #12

Math 231 AD1

Warm-up

1. What is the Harmonic Series? Does it converge or diverge?
2. How can you tell if a series is geometric? Under what conditions will it converge?
3. State the "nth Term Test" (you may also hear this called the Divergence Test).
4. Using the p-test, when does $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^p}$ converge?

Series (nth Term Test and Telescoping)

5. Find the first several partial sums ($s_1, s_2, \dots$), and then determine whether the series converges or diverges. (Find its value if it does converge)

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

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

   (c) $\displaystyle\sum_{n=0}^{\infty} \frac{2}{n^2+3n+2}$

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

Integral Test

6. If you want to use the Integral Test, you **MUST** verify the following three conditions:

   (a) ____________________________

   (b) ____________________________

   (c) ____________________________

7. If applicable, use the Integral Test to determine if the following series are convergent or divergent; otherwise, state why the Integral Test can't be used.

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

   (b) $1 + \dfrac{1}{2\sqrt{2}} + \dfrac{1}{3\sqrt{3}} + \dfrac{1}{4\sqrt{4}} + \dots$

   (c) $\displaystyle\sum_{n=1}^{\infty} \frac{\cos(\pi n)}{n^2}$

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

   (e) $\displaystyle\sum_{n=1}^{\infty} \frac{e^n}{n}$

   (f) $\displaystyle\sum_{n=1}^{\infty} \frac{e^{1/n}}{n^2}$