My Notes for AP Calculus BC

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9.1 Defining Convergent and Divergent Infinite Series

9.2 Geometric Series

Definition 1. *A series in the form* $\sum ar^n = a + ar + ar^2 + ar^3 + ... + ar^n ...$ *is called a geometric series with ratio* r*.*

An infinite geometric series with ratio r diverges if $|r| \geq 1$. If $|r| < 1$, we can say that the series converges by the **geometric series test**. The infinite sum of this series is

$$\sum_{n=0}^{\infty} ar^n = \frac{a}{1-r}$$

9.3 nth Term Test

9.4 Integral Test

Definition 2. *If* f *is positive, continuous, and decreasing for* $x \geq m \geq 1$ *where* m *is a positive integer and* $a_n = f(x)$*, then* $\sum_{n=1}^{\infty} a_n$ *and* $\int_1^{\infty} f(x)\,\mathrm{d}x$ *either both converge or diverge.*

Use implicit integration to determine whether the integral converges or diverges. **Note:** The answer to the limit or the integral is *not* the sum of the infinite series.

9.5 p-series and Harmonic Series

Definition 3. *A p-series is an infinite series in the form*

$$\sum_{n=1}^{\infty} \frac{1}{n^p} = \frac{1}{1^p} + \frac{1}{2^p} + \frac{1}{3^p} + ... + \frac{1}{n^p} + ...$$

where p is a positive number.

The p-series will converge if $p > 1$ and diverge if $1 < p \leq 1$

9.6 Comparison Tests

9.7 Polynomial Test

9.8 Alternating Series

Chapter 10

Parametric, Polar, and Vector-Valued Functions