MATH 155 - Chapter 9.6 - The Ratio Test and Root Test:
(Can apply to positive and negative-term series)
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1. **<u>Theorem: Ratio Test</u>**

   Let $\sum\limits_{n=1}^{\infty} a_n$ be a series with nonzero terms, and suppose that

   $$\lim_{n \to \infty} \frac{|a_{n+1}|}{|a_n|} = \rho.$$

   1. If $\rho < 1$, then series converges absolutely, hence converges.
   2. If $\rho > 1$ or $\rho = \infty$, the series diverges.
   3. If $\rho = 1$, the test is inconclusive.

2. **<u>Theorem: Root Test</u>**

   Let $\sum\limits_{n=1}^{\infty} a_n$ be a series, and suppose that

   $$\lim_{n \to \infty} \sqrt[n]{|a_n|} = \rho.$$

   1. If $\rho < 1$, then series converges absolutely, hence converges.
   2. If $\rho > 1$ or $\rho = \infty$, the series diverges.
   3. If $\rho = 1$, the test is inconclusive.