**Harold’s Series Convergence Tests**

**Cheat Sheet**

24 March 2016

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| **1****Divergence or n*th* Term Test**Series: Condition(s) of Convergence:None. This test cannot be used to show convergence.Condition(s) of Divergence: | **2****Geometric Series Test**Series: Condition of Convergence:Sum:Condition of Divergence: | **3*****p* - Series Test**Series: Condition of Convergence:Condition of Divergence: |
| **4****Alternating Series Test**Series: Condition of Convergence:or if is convergentCondition of Divergence:None. This test cannot be used to show divergence.\* Remainder:  | **5****Integral Test**Series: when and is continuous, positive and decreasingCondition of Convergence: convergesCondition of Divergence: diverges\* Remainder:  | **6****Ratio Test**Series: Condition of Convergence:Condition of Divergence:\* Test *inconclusive* if  |
| **7****Root Test**Series: Condition of Convergence:Condition of Divergence:\* Test *inconclusive* if  | **8****Direct Comparison Test**Series: Condition of Convergence:and is absolutely convergentCondition of Divergence:and diverges | **9****Limit Comparison Test**Series: Condition of Convergence:and convergesCondition of Divergence:and diverges |
| **10****Telescoping Series Test**Series: Condition of Convergence:Condition of Divergence: None | **NOTE:**1) May need to reformat with partial fraction expansion or log rules.2) Expand first 5 terms. n=1,2,3,4,5.3) Cancel duplicates.4) Determine limit L by taking the limit as.5) Sum:  | **NOTE:** These tests prove convergence and divergence, not the actual limit or sum **S**. Sequence:  ()Series:  |

**Choosing a Convergence Test for Infinite Series**

Courtesy David J. Manuel

**Do**

**the individual No terms approach 0?**

**Series Diverges by**

**the Divergence Test**

**Yes**

**Does the series alternate**

**signs?**

**No**

**Yes**

**Do individual terms have factorials or exponentials?**

**No**

**Yes**

**Use Ratio Test**

**(Ratio of Consecutive Terms)**

**Is individual term easy to integrate?**

**No**

**Yes**

**Use Integral Test**

**Use Alternating**

**Series Test**

**(Do absolute value of terms go to 0?)**

**Do individual terms involve fractions with powers of n?**

**No**

**Yes**

**Use Comparison Test or Limit Comp. Test (Look at dominating terms)**