**Harold’s Infinite Series**

**Cheat Sheet**

22 September 2025

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| **Summation Form** | **Expanded Form** |
| **Exponential Functions** |  |
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| **Natural Logarithm Functions** |  |
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| **Geometric Series** |  |
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| Double Factorial (!!) |  |
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| **Binomial Series** |  |
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| **Trigonometric Functions** |  |
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| **Inverse Trigonometric Functions** |  |
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| **Hyperbolic Functions** |  |
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| **Inverse Hyperbolic Functions** |  |
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| **Constant** | **Series Summation** | **Expanded** |
|  | **Telescoping** |  |
|  | **Geometric** |  |
|  | **Archimède** |  |
|  | **Nilakantha (15th Century) II** |  |
|  |  |
|  | **Ramanujan-Sato** |  |
|  | **James Gregory (or Leibniz)** |  |
|  |  |
|  | **Nilakantha (15th Century) I** |  |
|  | **Basel Problem with Zeta** (solved by Leonhard Euler) |  |
|  | **Leonhard Euler** |  |
|  | **Euler's Alternating** |  |
|  | **Euler's Alternating** |  |
|  | **Zeta**  |  |
|  | **Zeta**  |  |
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|  | **Alternating Harmonic** |  |
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| **Bernoulli Numbers** | **Euler Numbers** | **Gamma Function** |
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| **Generating Function** |  |  |
|  |  |  |
| **Recursive Definition** | **Iterated Sum** | **Recursive Definition** |
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**Sources**

* <https://www.wolframalpha.com>
* <https://en.wikipedia.org>
* <http://ddmf.msr-inria.inria.fr/1.9.1/ddmf>
* <http://web.mit.edu/kenta/www/three/taylor.html>

**See Also**

* [Harold’s Taylor Series Cheat Sheet](https://www.toomey.org/tutor/harolds_cheat_sheets/Harolds_Taylor_Series_Cheat_Sheet.pdf)
* [Harold’s Infinite Products Cheat Sheet](https://www.toomey.org/tutor/harolds_cheat_sheets/Harolds_Infinite_Products_Cheat_Sheet.pdf)