**Harold’s Series Cheat Sheet**

16 March 2024

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| **Sigma Notation** | | |
| http://leanmath.com/blog/wp-content/uploads/2013/05/summation-notation.png | | |
| **Sequence** |  |  |
| **Series** |  |  |

**Recursive and Explicit**

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| **Operation** | **Arithmetic Series** | **Geometric Series** |
| **Summation Notation** |  |  |
| **Summation Expanded** |  |  |
| **Sum of n Terms**  **(Finite Series)** |  |  |
| **Sum of Terms**  **(Infinite Series)** |  |  |
| **Recursive nth Term** |  |  |
| **Explicit nth Term** |  |  |

**Summation Formulas**

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| **Type** | **Summation Formulas** |
| **Constant Multiple Rule** |  |
| **Sum Rule** |  |
| **Change of Bounds** |  |
| **Sum of Powers**  (Arithmetic Series) |  |
| **Interesting Summation Formulas** |  |

**Binomial Theorem**

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| **Binomial Series** | | **Expanded** | |
| **Pascal’s Triangle** | 1  1 1  1 2 1  1 3 3 1  1 4 6 4 1  1 5 10 10 5 1 |  |  |
| **Example** |  |  | |
| **Binomial Theorem** |  | | |
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**Factorials and Constants**

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| **Operation** | **Formula** |
| **Factorial** |  |
| **Double Factorial** | (Even n)  (Odd n) |
| **Gamma Function**  (Continuous Factorial) |  |
| **Combination** | *Converges for*  *and all complex r , r ≠ 0, where* |
| **Permutation** |  |
| **Fibonacci Sequence** | Recursive:  F0 = 0  F1 = 1  **Fn = Fn-1 + Fn-2**  Explicit:  **F** = {0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, 2584, …} |
| **Golden Ratio** | ≅ 1.6180 33988 74989 48482 04586 83436 56381 17720 30917 98057 … |
| **Euler’s Identity** | *Since in* |
| **Euler’s Number** | *e* ≅ 2.71828 18284 59045 23536 02874 71352 66249 77572 47093 69995 .... |
| **Imaginary Unit** |  |
| **Archimedes’ Constant (pi)** | π ≅ 3.14159 26535 89793 23846 26433 83279 50288 41971 69399 37510 ... |