**appendix II-**

**accommodating extremely large numbers**
**with higher, revised binary operations**

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***n = any revised binary operation**

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**+ or *1 = addition- the first binary operation (conventional).**

$$a + b = c$$

**OR**

$$a\ (*1)\ b = c$$

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**x or *2 = revised multiplication- the second revised binary operation.**

$$a \times b = c$$

**OR**

$$a\ (*2)\ b = c$$

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***3 = revised involution- the third revised binary operation.**

$$a^{b} = c$$

**OR**

$$a\ (*3)\ b = c$$

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***4 = revised hyper-involution- the fourth revised binary operation.**

$$a\ (*4)\ b = c$$

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**Revised hyper-involution is based upon repeated, revised involution in an analogous manner as revised involution is based upon repeated, revised multiplication and so forth.**

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**revised hyper-involution (*4)**

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**examples-**

$-3 \ (*4) \ 0 = 0$

$-3 \ (*4) \ -1 = -3$

$-3 \ (*4) \ -2 = -3 \ (*3) \ -3 = -27$

$-3 \ (*4) \ -3 = -3 \ (*3) \ -3 \ (*3) \ -3 = -19683$

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$-3 \ (*4) \ -4 = -3 \ (*3) \ -3 \ (*3) \ -3 \ (*3) \ -3$

$= -7.62 \ \mathrm{x} \ -10^{-12}$

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**revised hyper-involution (*4) equated to scientific notation**

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**examples-**

$+10\ (*4)\ 0 = 0$

$+10\ (*4)\ \pm 1 = +10$

$+10\ (*4)\ +2 = +10^{+10} = +10{,}000{,}000{,}000$

$+10\ (*4)\ +3 = (+10^{+10})^{+10} = +10^{+100}$

$+10\ (*4)\ +4 = [\,(+10^{+10})^{+10}\,]^{+10} = +10^{+1000}$

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**The last example value is greater than Skewes' number.**

**There is really no point in going further unless one is intent upon pursuing astronomical, combinatoric values- the highest known of which is Graham's number. For such an impractical mission, I recommend much higher, revised binary operations of which there are a theoretically-unlimited number which can be built in a perfectly likewise manner as those demonstrated.**

**As a number crunching principle, raising the revised binary operation is much more efficient than raising the second variable (b) which, in turn, is more efficient than raising the first variable (a). Of course, this is assuming that neither variable (a or b) is prohibitively close to “±1” .**

**revised *5 equated to scientific notation**

**examples-**

**+10 (*5) 0 = 0**

**+10 (*5) ±1 = +10**

**+10 (*5) +2 = +10 (*4) +10**

$$= +10^{+1,000,000,000}$$

**revised *5 - *10 equated to next lower revised binary operation**

**examples-**

**+10 (*5) +2 = +10 (*4) +10**

**+10 (*6) +2 = +10 (*5) +10**

**+10 (*7) +2 = +10 (*6) +10**

**+10 (*8) +2 = +10 (*7) +10**

**+10 (*9) +2 = +10 (*8) +10**

**+10 (*10) +2 = +10 (*9) +10**

revised *10 - *1,000,000
lightly enriched for number crunching

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examples-

+10  (*10)  +1

+10  (*10)  +100

+10  (*10)  +10,000

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+100  (*10)  +10,000

+100  (*100)  +10,000

+100  (*1000)  +10,000

+100  (*10,000)  +10,000

+100  (*100,000)  +10,000

+100  (*1,000,000)  +10,000

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**revised *1,000,000 - *1,000,000,000,000,000,000,000,000**
**heavily enriched for number crunching**

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**examples-**

**+100 (*1,000,000) +10,000**

**+100 (*1,000,000) +1,000,000**

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**+1000 (*1,000,000) +1,000,000**

**+1000 (*1,000,000,000) +1,000,000**

**+1000 (*1,000,000,000,000) +1,000,000**

**+1000 (*1,000,000,000,000,000) +1,000,000**

**+1000 (*1,000,000,000,000,000,000) +1,000,000**

**+1000 (*1,000,000,000,000,000,000,000) +1,000,000**

**+1000 (*1,000,000,000,000,000,000,000,000) +1,000,000**

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**Graham's number- where are you?**

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**I think you get the idea. If you have any rational reason to need or desire to go further, then you still have all means available to do so. There is no limiting problem. Instead, the problems become understanding or grasping the vast numbers you create, placing them on a comparative scale with known, comprehensible numbers, not making <u>any</u> errors, having enough time over the span of your entire life to complete the project you start and accomplishing anything at all worthwhile, meaningful or valuable to mathematics in exchange for this tremendous effort.**

**No positive value can <u>ever</u> be attained by this manner (or any other) which is even an extremely-small, finite fraction of the value of positive infinity due to the fact that all values which can be generated as such are inescapably finite, regardless of however great.**