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Period 4

Exponentiation Readme

How it works

This code allows you to use “successive squaring” to calculate exponents. While the regular method of just multiplying together a whole lot of numbers works in most cases (such as $4^4 = 4 * 4 * 4 * 4$), it doesn’t work for huge exponents such as $4^{12342341412341579692000}$. In this case, you would be multiplying 4s together for quite a while (possibly forever). To try to cut some time, the successive squaring idea uses two formulas, which I took from Wikipedia.

$$x^n = \begin{cases} x\left(x^2\right)^{\frac{n-1}{2}}, & \text{if } n \text{ is odd} \\ \left(x^2\right)^{\frac{n}{2}}, & \text{if } n \text{ is even.} \end{cases}$$

Source: Wikipedia

These two formulas are used to “simplify” the exponent until it becomes a number to the 1st power, where it is returned. This greatly cuts the amount of time that would otherwise be used to multiply numbers by themselves over and over again.

To use the code just replace the two final double variables `NUMBER` and `EXPONENT` with whatever values you please.

Credits

Thanks to Wikipedia for these formulas. I helped Sean do his code.