

NMU Math & CS Department
Problem of the Month, December 2022

Define an operation $a \uparrow b$ for positive integers a, b where:

$$a \uparrow b = a^{a^{\cdot^{\cdot^{\cdot^a}}}} \quad (\text{iterated exponentiation } b \text{ times}).$$

For example $2 \uparrow 4 = 2^{2^{2^2}} = 2^{2^4} = 2^{16} = 65,536$.

Suppose that the current time on an analog clock is 3:47 pm, i.e. the minute-hand is pointing at minute 47.

Assuming the clock can run forever, at which minute will the minute-hand point at in $7 \uparrow (6 \uparrow 5)$ minutes?