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# IIIT Delhi - RAM Maths Circle

## Session 7

(Organized by the Department of Mathematics, IIIT Delhi)

IIIT-Delhi

November 2, 2025

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1. A number of bacteria are placed in a glass. One second later each bacterium divides in two, the next second each of the resulting bacteria divides in two again, et cetera. After one minute the glass is full. When was the glass half-full?
2. A caterpillar crawls up a pole 75 inches high, starting from the ground. Each day it crawls up 5 inches, and each night it slides down 4 inches. When will it first reach the top of the pole?
3. Pete bought a notebook containing 96 pages, and numbered them from 1 through 192. Victor tore out 25 pages of Pete's notebook, and added the 50 numbers he found on the pages. Could Victor have gotten 1990 as the sum?
4. Do seven-digit numbers with no digits 1 in their decimal representations constitute more than 50 percent of all seven-digit numbers?
5. Find  $\gcd(2^{100} - 1, 2^{120} - 1)$ .

