Today: Reducibility. § 5.*.
Next class: Reducibility; computability wrap-up. § 5.*.

1. List the members of your group below. Underline your name.

2. Suppose there is a blackbox program `haltcheck` that, when given the Python source of any program $H$ as standard input, writes, to standard output, `yes` if $H$ _always_ halts (regardless of input given to $H$) and `no` otherwise. Provide the Python source for a program $D$ that behaves as follows:

   - It reads two items from standard input (separated by the special token `-----`): Python source of a program $P$ and string input $w$ for $P$.
   - It writes `yes` to standard output if $P$ halts on input $w$ with output `yes`; otherwise it writes `no`.
3. The hailstone sequence from $s$, written $h_s(1), h_s(2), \ldots$, is defined as follows for positive integers $s$ and $i$.

$$h_s(i) = \begin{cases} 
  s & \text{if } i = 1 \\
  1 & \text{if } i > 1 \text{ and } h_s(i - 1) = 1 \\
  h_s(i - 1)/2 & \text{if } i > 1, h_s(i - 1) > 1, \text{ and } h_s(i - 1) \text{ is even} \\
  3h_s(i - 1) + 1 & \text{otherwise}
\end{cases}$$

Can the program haltcheck of Question 2 be used to determine whether the sequences $h_i(s)$ converge to 1 for all $s$? Explain your answer.