

Today Reducability. §§ 5.*.

Next class Portfolio presentations.

Reminders Newsgroup.

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

2. Suppose there is a blackbox program `haltcheck` that, when given the Java or 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 Java or 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 $h_s(1), h_s(2), \dots, h_s(i), \dots$, 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 $h_s(i)$ converge to 1 for all s ? Explain your answer.