

Lab2: Collatz Conjecture

Task

Collatz Conjecture was proposed by Lothar Collatz in 1937. Here is the proposition.

For a given sequence,

$$a_n = \begin{cases} \frac{a_{n-1}}{2} & a_{n-1} \text{ is an even number} \\ 3a_{n-1} + 1 & a_{n-1} \text{ is an odd number} \end{cases}$$

the conjecture is: $\forall a_0 \in \mathbb{N}^*, \exists k \in \mathbb{N}^*, \text{s.t } a_k = 1$.

For example, $a_0 = 6$, the sequence is 6,3,10,5,16,8,4,2,1. So $k = 8$.

You are required to confirm the conjecture when a_0 is a small number ($a_0 < 100$). a_0 will be stored in **x3100**.

Your Job

Find the minimum k and save it in **x3101**.

Examples

x3100	6	16	26	36	46	56	66	76	86	96
x3101	8	4	10	21	16	19	27	22	30	12

Score

Correctness for 50% and the report for other 50%.

Submission

Note that from this experiment, each experiment requires using **assembly code**.

1. Your program should start with **.ORIG x3000**

2. Your program should end with **.END**
3. Your last instruction should be **TRAP x25(HALT)**
4. Use **capitalized** keywords and labels(e.g. "ADD" rather than "add")
5. Maintain **spaces** after **commas** for clarity
6. **Decimal** constants start with **#**,**hexadecimal** with lowercase **x**
7. Write **comments** when necessary
8. Named your code `lab2.asm` and your report `PBXXXXXXXX_name.pdf`,put them into `PBXXXXXXXX_name.zip` and upload it.

Reports

Your report should be structured into the following sections:

Purpose

Principles:(e.g. how you deal with division and multiplication)

Procedure:(e.g. bugs you encountered and how to solve them)

Results