Foundation Retake

Code wisely, for the faith of Middle-Earth rests in your hands!

1. The Ents' March

During the crucial battle, the Ents decide to march to Isengard. They start with **n** Ents and every **h** hour, **m** more Ents join them. Calculate the total number of Ents marching after **t** hours.

- Input: Four integers:

    - **n** - initial count

    - **m** - increase of the count.

    - **h** - hours of the increase.

    - **t** - duration of the march.

- Constraints: n increases by m every h hour during the march.

Input/Output:

Input	Output
50, 10, 2, 6	85
30, 5, 3, 9	45
40, 8, 1, 7	96
100, 20, 2, 10	200
60, 12, 3, 15	120

"We must not be hasty."
—Treebeard

2. Elvish Encryption

Elves encrypt their messages by reversing every word in a sentence. Write a function to decrypt these messages. Observe the punctuation (**?!.,+-=><**) and digits.

- Input: A string **s** (1 ≤ |s| ≤ 100) representing the encrypted message.

Input/Output:

Input	Output
"neht rof on!"	then for no!
"lirpa ot noitseuq"	april ot question
"gnir – elvish"	ring - shivle
"!on -> sey!"	!no -> yes!
"123 abc ,.!"	123 cba ,.!

…Quendian was spoken by all the Elves soon after their Awakening…

3. Middle-Earth Artifact Locating

Middle-Earth, with its rich history, holds many artifacts each with its own story and legacy. Scholars in Minas Tirith often study these artifacts to understand the ancient world and its myriad events. Your task is to create a system that helps in locating the artifacts in the vast records of Middle-Earth's history. Create a program that identifies all occurrences of a specified artifact within the archive. If found, it should display the index positions, otherwise, notify about its absence – Artifact not found.

- Input: A string representing the artifacts and a string representing the search term.

Input/Output:

Input	Output
"OneRing Palantir OneRing Sting Mithril", "OneRing"	Found at positions: [0, 2]
"Vilya Narya Vilya Nenya Vilya Narya", "Vilya"	Found at positions: [0, 2, 4]
"Sauron Arwen Aragorn Elrond", "Narsil"	Artifact not found
"FrOdO, AragOrn, ElrOnd", "frOdO"	Artifact not found
"OneRing Palantir OneRing Sting Mithril", "Palantir"	Found at positions: [1]

…Many are the strange chances of the world,' said Mithrandir, 'and help oft shall come from the hands of the weak when the Wise falter …

4. Elrond's Council

In the tumultuous times in Middle Earth, the Council of Elrond is a pivotal meeting where members from various regions and races congregate to decide the fate of the One Ring. Decisions in the Council are made based on a voting system where every member votes either "Keep", "Destroy", "Use" or "Hide" for what to do with the One Ring.

Write a function that determines the outcome of a vote in the Council of Elrond. Given an array of strings, each string being a vote ("Keep", "Destroy", "Hide" or "Use"), determine which decision has the majority. If no decision has a majority, the result should be "Undecided". They can decide to "Use" the Ring only with absolute majority.

- Input: An array of strings (votes).

Input/Output:

Input	Output
["Keep", "Keep", "Destroy", "Hide"]	Keep
["Use", "Use", "Use", "Hide", "Hide", "Keep"]	Hide
["Destroy", "Keep", "Hide", "Use"]	Undecided
["Use", "Use", "Use"]	Use
["Destroy", "Hide", "Keep", "Use", "Use", "Destroy"]	Destroy

"Even the smallest person can change the course of the future."
— Galadriel

5. Battle of Helm's Deep

During the massive Battle of Helm's Deep, Aragorn leads the soldiers of Rohan against the Uruk-hai army. Each soldier when facing orc can attack using an arrow represented by ">", defend using a shield, represented by "]", or attack with sword, represented by "-".

The orcs can defend against arrows using shield [, can attack using arrow <, or can block with sword "-".

Determine if the duel is won, or if a clash is balanced, consider it Tie.

- Input: A string sequence of strikes and counterstrikes.

Input/Output:

Input	Output
">[]<--"	Tie
">--["	Tie
">>[-"	Won
">>[[>-->[["	Tie
"->-["	Won

"So it begins."
— Théoden, King of Rohan

6. Paths Through Moria

Manage a list that records paths that the Fellowship could take through Moria. The program should execute various commands like inserting, removing, swapping, and printing paths from the list, while also handling invalid indices gracefully.

Description:

- Input: An initial array of paths and a list of commands until receiving end.

Commands:

1. **"remove [path]"**: the path is removed from the list.

2. **"swap [index1] [index2]"**: swap the positions of two paths with the given indices.

3. **"add [path]"**: A new path is added at the end.

4. **"insert [path] [index]"**: Insert a new path at a specific index.

5. **"print middle"**: Display the path in the middle of the list. If there's an even number of paths, display the middle two.

Note: Ensure the commands handle edge cases, e.g., removing a non-existent path or inserting it at a position out of bounds should take no action.

Input	Output
["West-door", **"Bridge"**, **"Khazad-dûm"],** **["insert Balin's-Tomb 1"**, **"remove Khazad-dûm"**, **"add East-gate"**, **"swap 0 2"**, **"print middle"]**	West-door Balin's-Tomb Bridge Khazad-dûm West-door Balin's-Tomb Bridge West-door Balin's-Tomb Bridge East-gate Bridge Balin's-Tomb West-door East-gate Balin's-Tomb West-door
["Durin's-Bane", **"Gandalf's-Fall"],** **["insert Mirror 0"**, **"remove Gandalf's-Fall"**, **"swap 0 1"**, **"print middle"]**	Mirror Durin's-Bane Gandalf's-Fall Mirror Durin's-Bane Durin's-Bane Mirror Durin's-Bane Mirror
["Book", **"Orcs"],** **["insert Troll 0"**, **"insert Gollum -1"**, **"remove Book"**, **"add Shadows"**, **"insert Light 2"**, **"swap 100 2"**, **"print middle"]**	Book Orcs Troll Book Orcs Troll Orcs Troll Orcs Shadows Troll Orcs Light Shadows Orcs Light
["Drums", **"Shadows"],** **["add Dark"**, **"insert Light 3"**, **"remove Drums"**, **"swap 1 0"**, **"print middle"]**	Drums Shadows Dark Drums Shadows Dark Light Shadows Dark Light Dark Shadows Light Shadows
["Gate", **"Bridge"],** **["add Stairs"**, **"insert Hall 1"**, **"swap 2 0"**, **"print middle"]**	Gate Bridge Stairs Gate Hall Bridge Stairs Bridge Hall Gate Stairs Hall Gate

...they dug too deeply and greedily for mithril and to their loss they unearthed a nameless terror in the depths beneath the city..."