1 Simple Stuff

Prerequisites: control flow (branching, iteration), IO, arithmetic, atomic types.

The Good Old Days ★☆☆☆☆

Input: An integer 4.
Output: The word `"Elephant"`.

In	Out
4	Elephant

Equation of a Line ★☆☆☆☆

Input: Two integers k and b, $k \neq 0$.
Output: Such value x, that it satisfies the equation $kx + b = 0$.

Wait, what? ★★☆☆☆

Input: Two integers a and b.
Output: The product of a and b.
Note: You may not use the multiplication operation.

In	Out
1 0	0
7 8	56

Late'o'clock ★★☆☆☆

Input: An integer $0 \leq h < 24$. Hours on a clock.
Note: Convert the given time h to the 12-hour clock format.
Output: First the time h in 12-hour clock format, then `"am"` or `"pm"` depending on the time.

In	Out
0	12
8	8am
13	1pm

Quadratic Equations ★★☆☆☆

Input: Three integers a, b and c.
Output: Find all values of x, such that $ax^2 + bx + c = 0$.
Note: If there are no possible values of x output `"NaN"` (not a number). The values should not be repeated.

In	Out
1 -1 -6	-2 3

Qubic Equation ★★★☆☆

Input: Four integers a, b, c and d.
Output: Find all values of x, such that $ax^3 + bx^2 + cx + d = 0$.
Note: If there are no possible values of x output `"NaN"` (not a number). The values should not be repeated.
Hint: use Cardano's formula.

Euclid Approves ★☆☆☆☆

Input: Two integers a and b, sides of a right angled triangle.
Output: The hypotenuse c of the aforementioned triangle.

In	Out
3 4	5

Euclid Disapproves ★★☆☆☆

Input: Two integers a and b, sides of a right angled triangle and an integer angle θ (given in degrees) between them.
Output: The third side of the triangle.
Hint: You may use `import math` to get some functions you might want.

Everyone but Euclid Approves ★★★☆☆

Input: An integer n the amount of following lines, $3 \leq n \leq 100$. Each following line i contains a number $-100 \leq a_i \leq 100$, a component of the vector $\hat{v} = \{a_1, a_2, \ldots, a_n\}$.
Output: The length of a vector $\|\hat{v}\|$.

Minmaxed ★☆☆☆☆

Input: Two integers, a and b.
Output: Two integers, first the largest of them two, next the smallest.

TreE ★★★☆☆

Input: An integer h, the height of the christmass tree.
Output: A christmas tree with total height $h + 1$, 1 being the trunk of said tree and h all the result of it.

In	Out
4	e a a e e e a a a a a

Sigma for Sum ★★☆☆☆

Input: An integer a such that $1 \leq a \leq 10^{10^{10}}$.
Output: The sum all the integers $1 + 2 + \square\square\square + a$.
Hint: Loop isn't the only way to go.

Factor!al ★★☆☆☆

Input: An integer a such that $1 \leq b \leq 10^5$.
Output: The product all the integers $1 \times 2 \times \square \times b$.
Hint: Lookup the arguments for `range` in the official Python3.x documentation.

Minmaxed 2: The Sequel ★★★☆☆

Input: Two integers, a and b.
Output: Two integers, first the largest of them two, next the smallest.
Note: You may only use `min()` or `max()`, not both. You may not use branching.

Set Product ★★☆☆☆

Input: Two integers, a and b where $a > 0$ and $b > 0$. They create sets of values: $A = \{0, 1, \ldots, a - 1\}$ and $B = \{0, 1, \ldots, b - 1\}$.
Output: Print out the product of the two sets.
Note: A product of two sets is a mapping of every element of one set to every element of another, e.g. for sets $C = \{1, 2\}$ and $D = \{3, 4\}$ the product is $C \times D = \{(1, 3), (1, 4), (2, 3), (2, 4)\}$.

2 Turtle or Tortoise?

Prerequisites: `turtle` module, the entire previous section.

Fair Square ★☆☆☆☆

Input: An integer A such that $10 \leq A \leq 100$.
Output: Using `from turtle import Turtle`'s methods like `forward` and `right` draw a square of length A.

Fair Ngon ★★☆☆☆

Input: Two integers, A such that $10 \leq A \leq 100$ and N such that $2 \leq N \leq 20$.
Output: Using `Turtle` draw a regular polygon (an N-gon) with N sides and side length $5A$. Ensure that the turtle finishes in the same position as it started in. The turtle shouldn't draw over itself at any point.
Hint: Loops are your friend.

Trigonometry BFF ★★★☆☆

Input: Two integers, a and b.
Output: Using `Turtle` draw a graph of the function $y = a \cdot sin(\frac{\pi x}{10}) + b$. From 0 to 200 and a graph of the function $y = b$. Print the final position of the turtle.
Hint: You can get sin and π with `from math import pi, sin`, they are accurate enough for this purpose.

The Fair Ngon ★★★★★

Input: Two integers, A such that $10 \leq A \leq 100$ and N such that $2 \leq N \leq 20$.
Output: Using `Turtle` draw a regular polygon (an N-gon) with N sides and side length $10A$. Ensure that the turtle finishes in the same position as it started in. You are only allowed to control the turtle with `goto`.
Hint: Trigonometry might help.

Tick Space Tick Space Tick ★★☆☆☆

Input: Two integers, $10 \leq L \leq 100$ and $1 \leq N \leq 15$.
Output: Draw a horizontal dotted line of N segments. The length of each segment should be L. The space between two segments should also be L.
Note: The turtle should start and end the drawing with a filled segment.
Hint: Make use of `turtle.penup`, `turle.penup` and `turtle.isdown`.