1 Simple Stuff

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

1.1 The Good Old Days ★☆☆☆☆

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

1.2 Equation of a Line ★☆☆☆☆

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

1.3 Wait, what? ★★☆☆☆

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

1.4 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.

1.5 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.

1.6 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.

1.7 Euclid Approves ★☆☆☆☆

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

1.8 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.

1.9 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 $||\hat{v}||$.

1.10 Minmaxed ★☆☆☆☆

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

1.11 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.

```
e
a a
e e e
a a a a
a
```

1.12 Sigma for Sum ★★☆☆☆

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

1.13 Factor!al ★★☆☆☆

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

1.14 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.

1.15 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.

2.1 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.

2.2 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.

2.3 Trigonometry BFF ★★★☆☆

Input: Two integers, a and b.
Output: Using `Turtle` draw a graph of the function $y = a * sin(\frac{\pi x}{10}) + b$. 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.

2.4 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.

2.5 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`.