INSTRUCTIONS TO SOLVE THE PROBLEM

Based on test cases, as given earlier, considering input as

$$\big(x, f(x)\big) = [(0,0), (1,1), (2,4), (3,9), (4,16), (-1,1), (-2,4), (-3,9), (-4,16)]$$

The values for x and $f(x)$ are bisected and sorted in ascending order in 2 array lists as:

`sorted_x []` which will contain -> $[-4, -3, -2, -1, 0, 1, 2, 3, 4]$

`sorted_fx []`, which will contain -> $[16, 9, 4, 1, 0, 1, 4, 9, 16]$

#CORNER POINTS

From this, we can deduce the corner points, where the value of x reached at most, by the following code

```
corner_point_lowest = sorted_x[0]

corner_point_highest = sorted_x[-1],
```

where the initial value and the last value of the `sorted_x` are extracted into the variable,

`'corner_point_lowest' and 'corner_point_highest'`

#EXTREMAS

By theory, we know the extremas happen at the point where there are turning points in a graph.

Minima is the point where the graph is at minimum point and is an increasing function.

Maxima is the point where the graph is at maximum point and is a decreasing function.

Based on test cases, as given earlier,

$$\big(x, f(x)\big) = [(0,0), (1,1), (2,4), (3,9), (4,16), (-1,1), (-2,4), (-3,9), (-4,16)]$$

The values for x and $f(x)$ are used to form an equation by putting the values into linear equation solver.

In this case, the values a, b, c are returned by following the quadratic rule,

$$ax^2 + bx + c$$

Then, using those values of a, b, c an analytic equation is form.

Putting x into the `analytic_function(x)` will give the same result as in $f(x)$

Then, by deriving first order of the analytic equation, we will get the first derivative, which is $f'(x)$

Now, solve for the values of x when $f'(x) \; = \; 0$

The points of x that are obtained are called critical values or extremas.

Now to determine, the mimima or maxima, we simply have to put the critical values into the derivative function that is in this test case,

Extremas: 0, -4, 4

Put $f'(0)$, $f'(-4)$, $f'(4)$ respectively and check for the sign of the value whether it is negative or positive.

The value that gives $f'(x)$ positive value is the maxima and similarly, the value that gives $f'(x)$ negative value is the minima.