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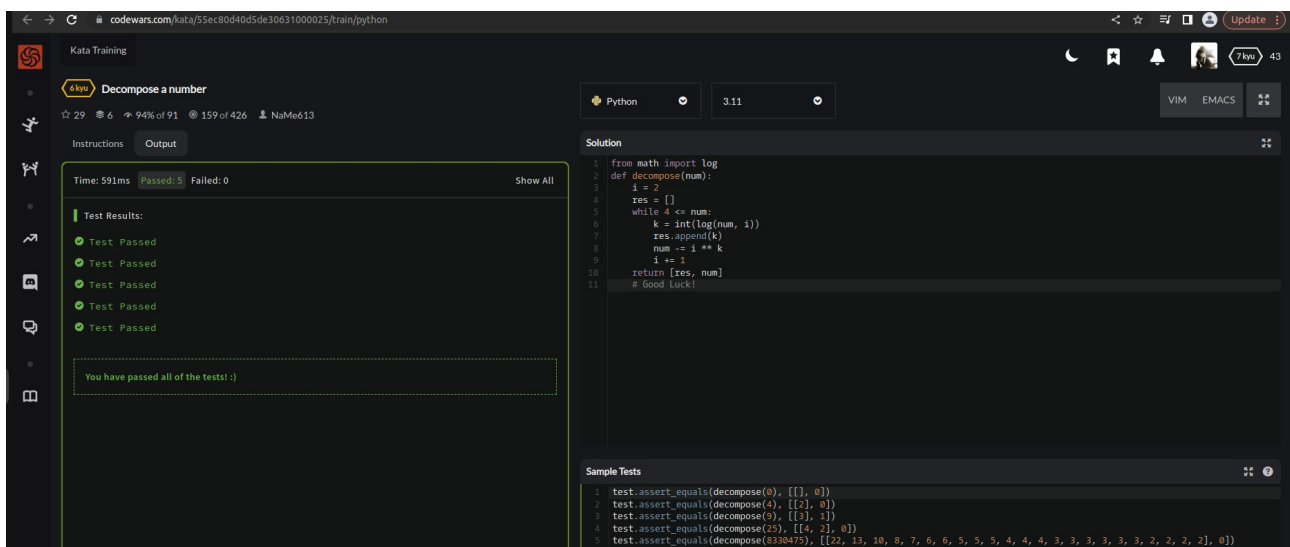
Decompose a number

DESCRIPTION:

Decompose a number `num` into an array (tuple in Haskell, array of arrays `long[][]` in C# or Java) of the form `[[k1, k2, k3...], r]`, `([k1, k2, k3...], r)` in Haskell, `[[k1, k2, k3...], [r]]` in C# or Java) such that:

1. each k_n is more than one
2. each k_n is maximized (first maximizing for 2 then 3 then 4 and so on)
3. and $2k_1 + 3k_2 + 4k_3 + \dots + nk_{n-1} + r = \text{num}$

SOLUTION:



The screenshot shows a coding kata interface for 'Decompose a number'. On the left, the 'Test Results' section shows five 'Test Passed' messages. The main area displays a Python solution for the problem. The solution uses a while loop to find the largest exponent k such that i**k is less than or equal to num, then appends k to a list res and updates num to num - i**k. The final result is a list containing res and the remaining num.

```
1 from math import log
2 def decompose(num):
3     i = 2
4     res = []
5     while i <= num:
6         k = int(log(num, i))
7         res.append(k)
8         num -= i ** k
9         i += 1
10    return [res, num]
11    # Good Luck!
```

Sample Tests:

```
1 test.assertEqual(decompose(0), [[], 0])
2 test.assertEqual(decompose(4), [[2], 0])
3 test.assertEqual(decompose(9), [[2], 1])
4 test.assertEqual(decompose(25), [[4, 2], 0])
5 test.assertEqual(decompose(8330475), [[22, 13, 10, 8, 7, 6, 6, 5, 5, 5, 4, 4, 4, 3, 3, 3, 3, 3, 2, 2, 2], 0])
```

EXPLANATION:

We're asked to calculate the total decompose a number into array. So therefore, to decomposing an array in our python function we'll take a positive integer num as an input, and returns a list containing two elements. Scenario of algo is based on firstly by:

- a) Initializing i to 2, and an empty list res to store the exponents of the powers.
- b) While num is greater than or equal to 4. Compute the largest exponent k such that i^{**k} is less than or equal to num, using the logarithm function. Append k to the list res.
- c) Subtract i^{**k} from num to update its value.
- d) Increment i by 1 to move to the next consecutive integer.
- e) Return the list res and the remaining value of num.