

Tanyaradzwa Chisepo

Code2040: Advanced Algorithms [2023] Results

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Assessment Summary

100%

1 h, 26 m, 13 s

Active Time

- Tanyaradzwa Chisepo **opened** this assessment on Sunday, July 3, 2022 12:06 AM
- Tanyaradzwa Chisepo **started** this assessment on Sunday, July 3, 2022 12:06 AM
- Tanyaradzwa Chisepo **submitted** this assessment after **5 days, 21 hours and 55 minutes** on Friday, July 8, 2022 10:02 PM
- This student spent **1 hour and 26 minutes** active in the browser working on the assessment

Solutions Summary

Challenge	Score	Active Time
✓ #1: Split Integer	100%	46 m, 33 s
✓ #2: Valid Braces	100%	18 m, 23 s
✓ #3: Base64 Encoding	100%	21 m, 17 s

#1: Split Integer



✓ Scoring

100%

4 / 4 Tests (5 Attempts)

⌚ Timing

46 m, 33 s Active Time

765 ms Run Time

📝 Candidate Notes:

integer division

modulus function, get remainder

```
split(10, 2) = [5, 5]
```

```
div = 10//#parts
```

```
result = div x #parts
```

```
if number%parts ==0:
```

```
    for i in range(#parts):  
        array.append(div)
```

```
else:
```

Instructions

Task

In this challenge, you will write a function to divide an integer into a number of even parts, which will be returned in a result array. Summing the integers in this result array will produce the original number.

For example, given `number = 10` and `parts = 2`, `splitInteger(10, 2)` should return an array of integers with length equal to `parts`: `[5, 5]`.

Not all numbers will offer a clean division. In this case, we should split the number as closely as possible to even, with the smaller numbers in the front of the array. For example,

```
splitInteger(11, 3) → [3, 4, 4]
```

There is no reason to test for edge cases; the input to your function will always be valid for this challenge. Please see the below specification for the exact constraints on the input:

```
{  
  "method": "split_integer",  
  "desc": "Divides an integer into an even number of parts.",  
  "args": {  
    "num": {  
      "type": "Integer",  
      "desc": "The integer number that should be split into equal parts"  
    },  
    "parts": {  
      "type": "Integer",  
      "desc": "The number of parts that the integer should be split into"  
    }  
  },  
  "returns": {
```

```

    "type": "List<Integer>",
    "desc": "An array of part values which sum to `num`. The parts will be ordered from
smallest to largest."
  },
  "constraints": [
    "- `0 < num ≤ 100`",
    "- `0 < parts ≤ num`"
  ],
  "examples": [
    {
      "name": "Completely even parts",
      "args": [10, 5], "returns": [2,2,2,2,2]
    },
    {
      "name": "Divided as closely as possible into even parts with the smallest parts grouped
at the front of the result",
      "args": [20, 6],
      "returns": [3,3,3,3,4,4]
    }
  ]
}

```

Solution Code

Python 

```

1
2
3 def split_integer(num, parts):
4     x = num
5     y = parts
6
7
8
9     #108 21 21 22 22 22
10
11     final_array = []
12
13     modulo = x%y
14     quotient = x//y
15
16     #for case with no clean division
17     if modulo != 0:
18
19         #evenly spread the remainder to each part
20
21         for i in range(y):
22             if i>= (y-modulo):
23                 final_array.append(quotient+1)
24
25             else:
26

```

```
27         final_array.append(quotient)
28
29     #for clean division
30     else:
31         for i in range(y) :
32             final_array.append(quotient)
33
34
35     return final_array
```

Candidate's Tests

```
1  import unittest
2  from solution import split_integer
3
4  class Test(unittest.TestCase):
5      def test_should_handle_evenly_distributed_cases(self):
6          self.assertEqual(split_integer(10, 1), [10])
7          self.assertEqual(split_integer(2, 2), [1,1])
8          self.assertEqual(split_integer(20, 5), [4, 4, 4, 4, 4])
```

#2: Valid Braces



✓ Scoring

⌚ Timing

100%

18 m, 23 s Active Time

6 / 6 Tests (1 Attempt)

724 ms Run Time

📝 Candidate Notes:

create regex, define valid brace pattern

correct order

return T or F

'{}[]' and '({})' is valid,, with matched braces

create two sets, opening and closing braces

create a dictionary, for matched braces

stack???

go through input, if current brace is opening, add it to the stack,

check to see if it is a closing brace and not in stack, immediately return false

Instructions

Write a function called `validBraces` that takes a string of braces, and determines if the order of the braces is valid.

`validBraces` should return true if the string is valid, and false if it's invalid.

All input strings will be nonempty, and will only consist of open parentheses `'('`, closed parentheses `')'`, open brackets `'['`, closed brackets `']'`, open curly braces `'{'` and closed curly braces `'}'`.

What is considered Valid?

A string of braces is considered valid if all braces are matched with the correct brace. For example:

`'(){}[]'` and `'({[]})'` would be considered valid, while `'(})'`, `'[()]'`, and `'[{()}]()'` would be considered invalid.

Specification

```
{
  "method": "valid_braces",
  "desc": "Checks if the brace order is valid",
  "args": {
```

```
"braces": {"type": "String", "desc": "A string representation of an order of braces"},
},
"returns": {"type": "Boolean", "desc": "Returns `true` if order of braces are valid"}
}
```

Examples:

Input	Output
<code>validBraces("(){}[]")</code>	<code>true</code>
<code>validBraces("{}")</code>	<code>false</code>
<code>validBraces("[()]")</code>	<code>false</code>
<code>validBraces("([{}])")</code>	<code>true</code>

Solution Code

Python 

```
1 def valid_braces(braces: str) -> bool:
2
3     opening = set('([{'
4     closing = set(')]}')
5     match = {'(' : ')', '[' : ']', '{' : '}'
6     stack = []
7
8     for i in braces:
9         if i in opening :
10             stack.append(i)
11         if i in closing :
12             if not stack :
13                 return False
14             elif stack.pop() != match[i] :
15                 return False
16             else :
17                 continue
18     if not stack :
19         return True
20     else :
21         return False
22
23
24
```

Candidate's Tests

```
1 import unittest
2 from solution import valid_braces
3
4 class TestSampleTests(unittest.TestCase):
5     def test_distinguish_valid_braces(self):
6         """ distinguish valid braces """
7         self.assertEqual(valid_braces("({})"), True)
8         self.assertEqual(valid_braces("[()]"), False)
9
```

#3: Base64 Encoding



✓ Scoring

⌚ Timing

100%

21 m, 17 s Active Time

3 / 3 Tests (2 Attempts)

534 ms Run Time

Instructions

Create a function or a method that converts the value of the String **to Base64** using the ASCII (UTF-8 for C#) character set.

Do not use built in functions.

As an example the input string `this is a string!!` should produce the output string `dGhpcyBpcyBhIHN0cm1uZyEh`.

You can learn more about Base64 encoding and decoding [here](http://en.wikipedia.org/wiki/Base64) (<http://en.wikipedia.org/wiki/Base64>) .

Specification

```
{
  "method": "to_base64",
  "desc": "",
  "args": {
    "str": {"type": "String", "desc": "String to be converted using Base64 format"}
  },
  "returns": {"type": "String", "desc": "The converted string"},
  "examples": [
    {"args": ["this is a string!!"], "returns": "dGhpcyBpcyBhIHN0cm1uZyEh"},
    {"args": ["ABCDEFGHIJKLMNOPQRSTUVWXYZ "], "returns": "QUJDREVGR0hJSktMTU5PUFFSU1RVVldYWVog"}
  ]
}
```

Solution Code

Python

```
1
2 #func to convert each char in string to 8-bit binary
3 def char_to_binary(string):
4
5     bin_str = ''
6     binary = []
7
8     for char in string:
9         #get ascii value of each char
```



```

10     ascii_char = ord(char)
11     #remove '0b' prefix
12     binary_char = bin(ascii_char).replace('0b', '')
13
14     #make 8-bit binary
15     asc = binary_char[::-1]
16     while len(asc) < 8:
17         asc += '0'
18         binary_char = asc[::-1]
19
20     binary.append(binary_char)
21     #combine all 8-bit binaries into single string
22     for bits in binary:
23         bin_str += bits
24     return bin_str
25
26
27
28 def to_base64(string):
29     temp = ''
30     count = 0
31     encoded = ''
32     result = []
33     six_bit = []
34
35
36     #dictionary to store base64 table
37     b64_dict = { 0: 'A', 1: 'B', 2: 'C', 3: 'D', 4: 'E', 5: 'F', 6: 'G', 7: 'H', 8: 'I', 9:
    'J', 10: 'K', 11: 'L', 12: 'M', 13: 'N', 14: 'O', 15: 'P', 16: 'Q', 17:
    'R', 18: 'S', 19: 'T', 20: 'U', 21: 'V', 22: 'W', 23: 'X', 24: 'Y', 25:
    'Z', 26: 'a', 27: 'b', 28: 'c', 29: 'd', 30: 'e', 31: 'f', 32: 'g', 33:
    'h', 34: 'i', 35: 'j', 36: 'k', 37: 'l', 38: 'm', 39: 'n', 40: 'o', 41:
    'p', 42: 'q', 43: 'r', 44: 's', 45: 't', 46: 'u', 47: 'v', 48: 'w', 49:
    'x', 50: 'y', 51: 'z', 52: '0', 53: '1', 54: '2', 55: '3', 56: '4', 57:
    '5', 58: '6', 59: '7', 60: '8', 61: '9', 62: '+', 63: '/' }
38
39
40     bin_str = char_to_binary(string)
41
42     #bunch binary digits into groups of 6
43     for bit in bin_str:
44         temp += bit
45         count += 1
46         if count == 6:
47             six_bit.append(temp)
48             temp = ''
49             count = 0
50
51     #6-bit binary back to base 10 integer
52     for group in six_bit:
53         decimal = int(group, 2)
54         result.append(decimal)

```

```
55
56     for decimal in result:
57         #use dictionary to convert integer to base64 char
58         letter = b64_dict[decimal]
59         encoded += letter
60
61     return encoded
62
```

Candidate's Tests

```
1  import unittest
2  # Note: the class must be called Test
3  class Test(unittest.TestCase):
4      def test_should_handle_sentences(self):
5          self.assertEqual(to_base64("this is a string!!"), "dGhpcyBpcyBhIHN0cmLuZyEh")
6          self.assertEqual(to_base64("this is a test!"), "dGhpcyBpcyBhIHRlc3Qh")
```