

# OneDegree Hong Kong Limited Software Development Entrance Exam

June 12, 2019

Duration: 1 hour

Examiners: Thomas Huang, Ken Hung

**Total Marks: 75 marks**

Last Name: \_\_\_\_\_

First Name: \_\_\_\_\_

Signature: \_\_\_\_\_

### Guidelines:

- You are expected to write your answers in the Python 3.0 language unless otherwise noted by the question
- Please write your answer in the space provided for each question. Use the back side of the sheets as needed
- This is a closed-book exam
- You may **NOT** use any unauthorized aids
- Please write neatly and legibly

Question	Marks	Question	Marks
1	5	6	10
2	10	7	10
3	10	8	10
4	10	Bonus	7
5	10		

### Question 1

The following data structure is declared and initialized:

```
1
2 fruits = { 'apple':'red', 'pear':'green', 'banana':'yellow', 'blueberry':'blue' }
3
```

Write a few lines of code so that the key and value pairs are swapped, i.e., keys become values and values become their corresponding keys.

### Question 2

Write a function that accepts one integer argument and determines whether the integer is a prime number. You may assume that the integer will be greater than or equal to one.

### Question 3

If you were to design an indented URL generator today, how would you design it?

### Question 4

Please briefly explain how the CORS mechanism works and its purpose.

### Question 5

Please briefly explain how the HTTP Cache mechanism(Expires, Cache-Control, Last-Modified, Etag) works and its purpose.

### Question 6

Given a non-empty array of integers, every element appears *twice* except for one. Find that single one.

Your algorithm should have a time complexity of  $O(n)$ . Could you implement it without using any extra memory?

Example:

**Input:** [4,1,2,1,2]

**Output:** 4

### Question 7

Suppose a website contains two tables, the **Customers** table and the **Orders** table. Write a SQL query to find all customers who never ordered anything.

Example:

Customers:

Id	Name
1	Joe
2	Henry
3	Sam
4	Max

Orders:

Id	CustomerId
1	3
2	1

Using the above tables as example, return the following:

Customers
Henry
Max

### Question 8

Given a triangle, find the minimum path sum from the top to bottom. Each step you may move to adjacent numbers on the row below.

For example, given the following triangle:

```
[
  [2],
  [3,4],
  [6,5,7],
  [4,1,8,3]
]
```

The minimum path sum from top to bottom is 11 (i.e.,  $2+3+5+1 = 11$ ).

Bonus point if you are able to do this using only  $O(n)$  extra space, where  $n$  is the total number of rows in the triangle.

### Bonus Question

Looking at the following code below, write down the final values of A0, A1, ..., A6

```
A0 = dict(zip(('a', 'b', 'c', 'd', 'e'), (1, 2, 3, 4, 5)))
A1 = range(10)
A2 = sorted([i for i in A1 if i in A0])
A3 = sorted([A0[s] for s in A0])
A4 = [i for i in A1 if i in A3]
A5 = {i:i*i for i in A1}
A6 = [[i, i*i] for i in A1]
print(A0, A1, A2, A3, A4, A5, A6)
```