NYU Shanghai Introduction to Computer Science
Sample Placement Test

Most of the materials below can be found here: http://anh.cs.luc.edu/python/handson/3.1/handsonHtml/index.html

The followings are exemplary questions taken from the tutorial above.

The very basics

Python as a calculator:

```
14/4
14/4
14%4
```

Write down the outputs; two digits after the decimal point is fine (e.g. 2.33333 → 2.33)

Print and simple arithmetic:

```
x = 3
y = 5
print('The sum of', x, 'plus', y, 'is', x+y)
```

Write down the output of the above

Taking inputs

```
person = input('Enter your name: ')
print('Hello', person)
```

When you run the above code and type in your name, what’s the output?

Control flow (if-else)

```
temperature = float(input('What is the temperature? '))
if temperature > 70:
    print('Wear shorts.')
else:
    print('Wear long pants.')
    print('Get some exercise outside.')
```

If you run the above code twice, type in inputs 79 and 59, respectively, what are the outputs? (Please include outputs of both cases)
Loops and sequences:

```python
items = ['red', 'orange', 'yellow', 'green']
number = 1
for item in items:  # print numbered entries
    print(number, item)
    number = number + 1  # crucial added line
```

Write down the output when you run the above code

**Building blocks**

**Functions**

```python
'''Function with parameter.'''

def happyBirthday(person):
    print('Happy Birthday to you!'
    print("Happy Birthday to you!"
    print("Happy Birthday, dear " + person + ".")
    print("Happy Birthday to you!"

happyBirthday('Emily')
happyBirthday('Andre')
```

How many lines of output the above code will produce? Please write the 3rd and the 6th line.

**Data structures**

**String**

'very' + 'hot'

If you assign the above to a variable x, what's x? What's x[2]?

**List**

```python
l1 = ['red', 'green', 'blue']
l2 = [1, 3, 5, 7, 9, 11]
l3 = ['silly', 57, 'mixed', -23, 'example']
l4 = []  # the empty list
```

Two questions:
- What's l1[2]?
- Can you write down a piece of code that prints all items in l3?

**Note:**
- Python list starts with index 0, i.e., the first element of list l is l[0]
- Refer to “loop and sequence” above for examples of iterating through a list
Dictionary

"""A tiny English to Spanish dictionary is created, using the Python dictionary type dict. Then the dictionary is used, briefly. """

```python
def createDictionary():
    '''Returns a tiny Spanish dictionary'''
    spanish = dict()
    spanish['hello'] = 'hola'
    spanish['yes'] = 'si'
    spanish['one'] = 'uno'
    spanish['two'] = 'dos'
    spanish['three'] = 'tres'
    spanish['red'] = 'rojo'
    spanish['black'] = 'negro'
    spanish['green'] = 'verde'
    spanish['blue'] = 'azul'
    return spanish

def main():
    dictionary = createDictionary()
    print(dictionary['two'])
    print(dictionary['red'])

main()
```

What's the output of running the above code?

Algorithmic thinking

http://nrich.maths.org/2478 The Clever Carl
This the story of the great mathematician Carl Gauss who gets the answer of summing up the integer from 1 to 100 faster than any other kids.

Describe how Carl did the work, and what's the sum (from 1 to 100)?

How many computational steps would a conventional approach do, if each “step” is rough an addition/subtraction operation? And how many will Carl’s method require?