COMPSCI 101
Principles of Programming

Exam Revision

Documentation and Following Style Guidelines

In the docstring of the `get_result()` function below, add a short description (fifteen words or less) of the function.

```
def get_result(number, list_of_numbers):
    """
    Returns the value from the list_of_numbers
    parameter which is closest to the number
    parameter.
    """
```

(2 marks)

```
    result_number = list_of_numbers[0]
    smallest_difference = abs(result_number - number)
    for value in list_of_numbers:
        diff = abs(value - number)
        if diff < smallest_difference:
            smallest_difference = diff
            result_number = value

    return result_number
```

Documentation and Following Style Guidelines

- Rewrite the following function using descriptive variable and function names.

```
def a(b):
    a = 0
    for c in range(b + 1):
        a += c ** 2
    return a
```

```
def                    (                ):
```

```
def sum_of_squares(number):
    total = 0
    for i in range(number + 1):
        total += i ** 2
    return total
```

Output of Executing a Function and Code Tracing

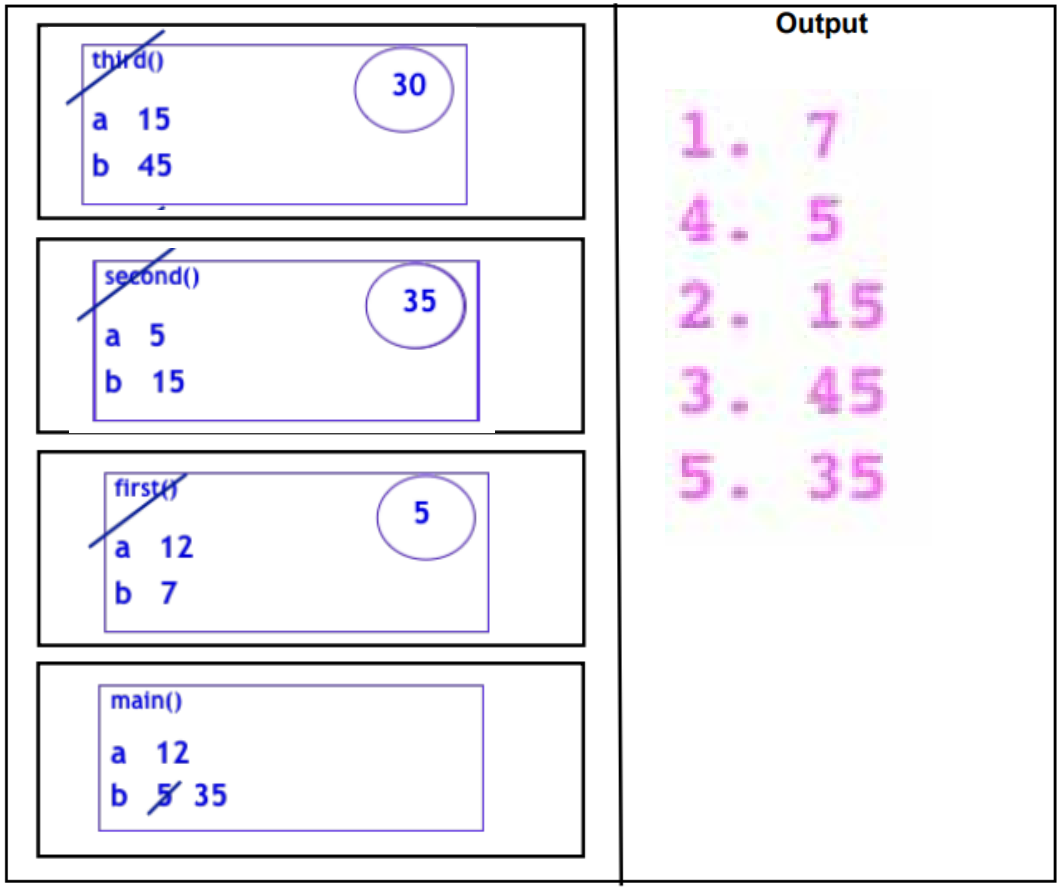
Give the output produced when the following `main()` function is executed.

```
def main():
    function_ifs(70, 45)

def function_ifs(num1, num2):
    if num1 < num2 and num2 < 60:
        print("A", end = " ")
        if num2 >= 10 and num2 % 2 == 0:
            print("B", end = " ")
        elif num1 % 10 < 3:
            print("C", end = " ")
        print("D", end = " ")
    else:
        if num1 > 50 or num2 < 50:
            print("E", end = " ")
        if num2 % 2 == 1:
            print("F", end = " ")
        print("G", end = " ")

    print("H")
```

E F G H

Output of Executing a Function and Code Tracing

```
def first(a):
    b = a - 5
    print("1.", b)
    return a % b

def second(a):
    b = a + 10
    print("2.", b)
    return a + third(b)

def third(a):
    b = a * 3
    print("3.", b)
    return b - a

def main():
    a = 12
    b = first(a)
    print("4.", b)
    b = second(b)
    print("5.", b)

main()
```



Output of executing functions involving lists, tuples, and dictionaries, including passing mutable parameters

```
def main():
    a_list = [3, 4, 1]
    fiddle1(a_list)
    print("a_list:", a_list)

def fiddle1(list1):
    elements_to_add = [5, 5, 3]
    list2 = list1
    for element in elements_to_add:
        if element not in list1:
            list2.append(element)
    list1.pop(1)
```

```
a_list: [3, 1, 5]
```

```
def main():
    a_list = [3, 5, 7]
    fiddle2(a_list)
    print("a_list:", a_list)

def fiddle2(list1):
    list2 = list1
    list1 = [3, 4]
    list2.reverse()
```

```
a_list: [7, 5, 3]
```

Output of executing functions involving lists, tuples, and dictionaries, including passing mutable parameters

Given the following code, what is the type of each of the three Python objects `object1`, `object2` and `object3`?

```
a_string = "MXQ339"
a_dict = {"A": "5", "M": [9, 3], "P": "M"}
a_list = [4, a_dict["P"], 2.5]

object1 = a_list.index(2.5)
object2 = a_dict[a_string[0]]
object3 = a_list[0] * a_list[-1]
```

`object1` is of type: `int`

`object2` is of type: `list`

`object3` is of type: `float`

File output and the output of running a nested loop

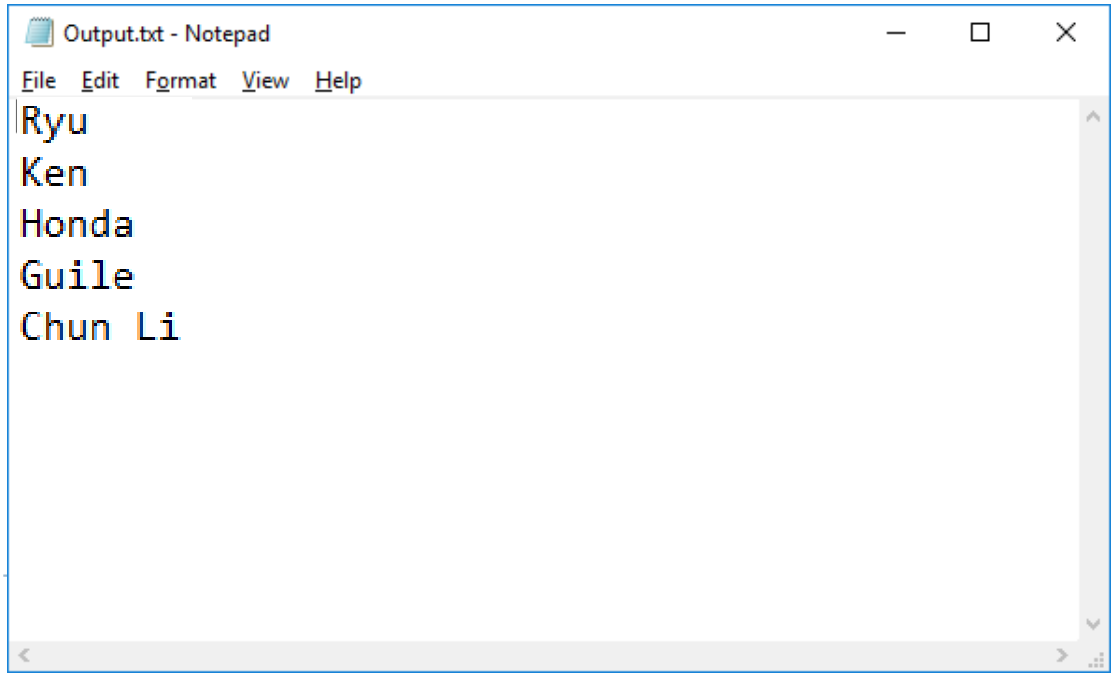
```
def main():
    list1 = [4, 6, 7, 8, 1]
    the_list = [7, 6, 5, 4, 4, 7, 7, 2, 7, 6]
    count = process_lists(list1, the_list)
    print("count:", count, " the_list:", the_list)

def process_lists(list1, list2):
    count = 0
    for element in list1:
        while element in list2:
            index = list2.index(element)
            list2.pop(index)
        count = count + 1
    return count
```

```
count:   5          the_list:   [5, 2]
```

File output and the output of running a nested loop

What are the contents of the file "**Output.txt**" after the following program is run?

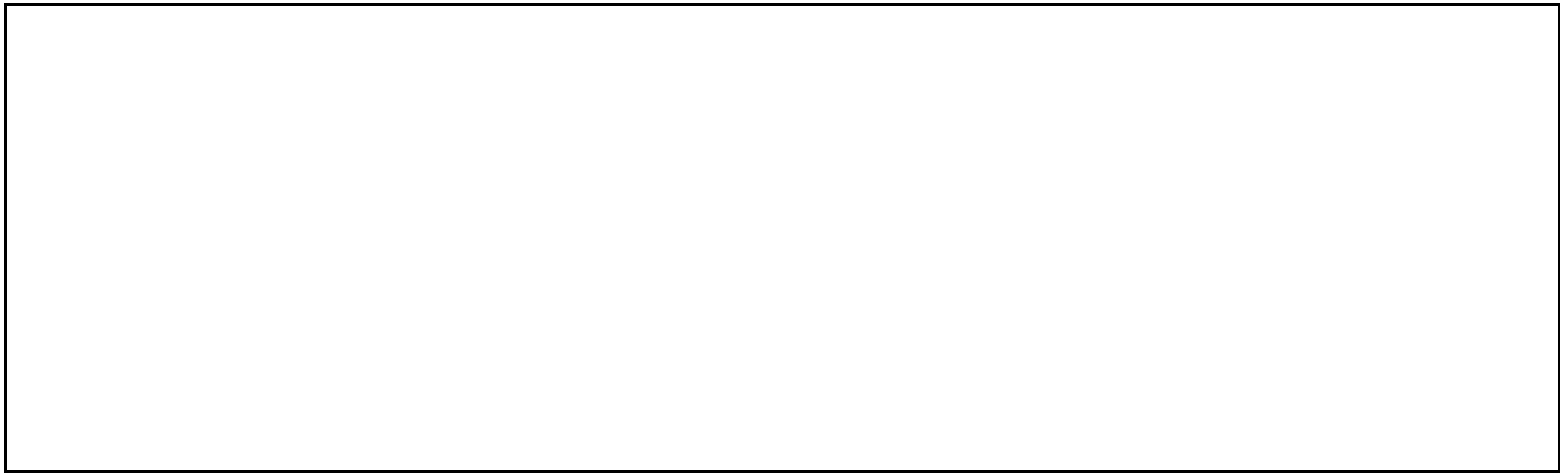
```
def main():
    data_tuple = ("Ken", "Ryu", "Guile", "Honda", "Chun Li")
    filename = "Output.txt"
    write_data(filename,data_tuple)

def write_data(filename,data_tuple):
    data_list = list(data_tuple)
    data_list.sort()
    data_list.reverse()
    output_stream = open(filename,"w")
    for item in data_list:
        output_stream.write(item + "\n")
    output_stream.close()

main()
```



Doctests

In the docstring of the `do_a_check()` function below, add ONE doctest which does not fail.

```
def do_a_check(value1, value2):
    """Checks the parameter values
```



```
    """
    list_of_words = value1.split()
    return len(list_of_words) == value2
import doctest
doctest.testmod()
```

Boolean Expressions

Assume that the variables, `value1` and `value2` have both been assigned some integer value. Write a boolean expression which evaluates to `True` if `value1` is exactly divisible by `value2`. Otherwise the expression evaluates to `False`.

```
value1 % value2 == 0
```

Assume that the variable, `words`, has been initialised to some string. Write the boolean expression which tests if the variable, `words`, has at least five characters and ends with the letter `"s"`.

```
len(words) >= 5 and words[-1] == "s"
```

Assume that the variables, `word1` and `word2` have both been assigned some string. Write a boolean expression which evaluates to `True` if both `word1` and `word2` contain the lowercase letter `"a"`. Otherwise the expression evaluates to `False`.

```
"a" in word1 and "a" in word2
```

Assume that the variable, `value`, has been initialised to some integer. Write the boolean expression which tests if `value` is a two digit number and has a last digit (the right hand units digit) which is a 6.

```
len(str(value)) == 2 and value % 10 == 6
```

Tkinter

As accurately as possible, in the window below, show what is drawn when the `main()` function of the following program is executed. The grid lines have been drawn in the window to help you. The gap between adjacent gridlines is 10 pixels.

```
def draw_snake(a_canvas):
    left_hand_side = 20
    y_down = 30
    size = 10
    snake_list = [(20,30),(30,30),(40,30),(40,20),(40,10),(50,10)]
    number_of_elements = len(snake_list)
    for number_to_do in range(number_of_elements):
        x_left = snake_list[number_to_do][0]
        y_down = snake_list[number_to_do][1]
        rect = (x_left, y_down, x_left + size, y_down + size)
        a_canvas.create_rectangle(rect)
        a_canvas.create_oval(rect)

def main():
    ...
    draw_snake(a_canvas)
    root.mainloop()
```