Addis Coder Quiz 2

Problem 1

What is the **printed output** of the following code?

```
numbers = {"asir" : "ten", "amist" : "five", "arba" : "forty"}

numbers["arba"] = 40
del numbers["asir"]
numbers["sabat"] = 7

print(numbers)
```

```
In [ ]:
```

Problem 2

What is the **printed output** of the following code?

```
count = 10
if count <= 10:
    for i in range(5):
        print(count)
```

```
In [ ]:
```

```
for i in range(5):
    if i < 3:
        print(i)
```

```
In [ ]:
```

```
count = 10
if count > 11:
    print(count)
for i in range(5):
    print(i)
```

```
In [ ]:
```

Problem 3

```
def square_area(num):
    return num ** 2

def print_square_area(num):
    print(num ** 2)
```

(a) What is the **value** of `hollow_square` in the code below? If there is an **error** explain why.

```
hollow_square = square_area(10) - square_area(5)
```

In [ ]:

```

```

(b) What is the **value** of `printed_hollow_square` in the code below? If there is an **error** explain why.

```
printed_hollow_square = print_square_area(10) -
print_square_area(5)
```

In [ ]:

```

```

Problem 4

Write a function `countCharacters(word)` that returns the **number of times each character appears** in the word.

Hint: Try using a dictionary

Example: `countCharacters("Addis")` --> `{"A":1, "d":2, "i":1, "s":1}`

In [ ]:

```
def countCharacters(word):
    # Write your code here
```

Problem 5

What is the **printed output** of the following code?

```
def default_params_func(x = 1, y = 2):
    print(x)
    print(y)


default_params_func()
```

In [ ]:

```
default_params_func(10)
```

In [ ]:

```
default_params_func(y = 15)
```

In [ ]:

```
default_params_func(10, 15)
```

In [ ]:

Problem 6

The following function is supposed to reverse the input string, but it **does not work**.

(a) What is the **output** of the following code? Hint: it is **not** `dcba`.

```
1   def reverse_string(string):
2       new_string = ''
3       for letter in string:
4           new_string = letter + new_string
5           return new_string
6
7   print(reverse_string('abcd'))
```

In [ ]:

(b) The output of `print(reverse_string('abcd'))` should be `abcd`.

In **which line** do you have to **change the indentation** of the code so that the code works?

In [ ]:

Problem 7

What image is produced by the following code? **Fill in the black pixels** below.

```
from simpleimage import SimpleImage

size = 5
image = SimpleImage.blank(size, size)
for i in range(size):
    image.set_rgb(i, i, 0, 0, 0)  # black pixel
for i in range(size-1):
    image.set_rgb(i, i+1, 0, 0, 0)  # black pixel
image.set_rgb(0, size-1, 0, 0, 0)  # black pixel

image.show()
```

	0	1	2	3	4
0					
1					
2					
3					
4					

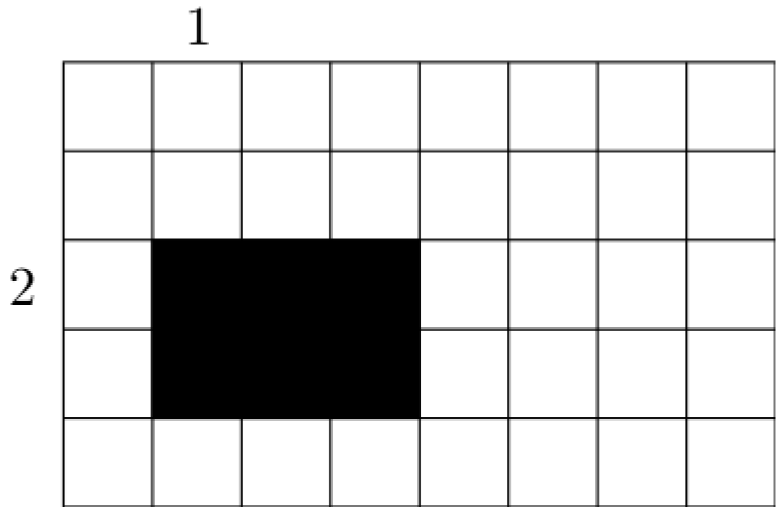
Problem 8

Fill in the function below to draw a black rectangle with given `width` and `height` onto the input `image`. The top left corner of the rectangle should be (x, y).

In [ ]:

```python
from simpleimage import SimpleImage

def draw_rectangle(image, x, y, width, height):
    # Write your code here









image = SimpleImage.blank(8, 5)
draw_rectangle(image, 1, 2, 3, 2)
image.show()
```

The code above should give the following rectangle:



Problem 9

What is the **printed output** of the following code?

```
def ysum(x):
    result = 0
    for i in x:
        result += i
    return result

def func(x):
    result = []
    for i in x:
        result += [ysum(i)]
    return result

print(func([[1,2,3],[4,5,6],[7,8,9]]))
```

In [ ]:

```
```

Problem 10

The following function computes the sum of digits of a number:

```
# Example: sum_of_digits(427) = 13
def sum_of_digits(n):
    total = 0
    for digit in str(n):
        total += int(digit)
    return total
```

A **Harshad number** is a number that is **divisible by its sum of digits**.

(a) **Fill in** the function `is_harshad` that takes a number `n` as a parameter and returns `True` **if it is a Harshad number**, and `False` otherwise.

You should **call** `sum_of_digits` in your code.

In [ ]:

```
def is_harshad(n):
    # Write your code here
```

(b) **Write a function** `print_harshads` that takes a number `n` and **prints all Harshad numbers** from 1 to `n` (including `n`).

You should **call** `is_harshad` in your code.

In [ ]:

```

```

Problem 11

The code below crashes with the error: `TypeError: unsupported operand type(s) for +: 'NoneType' and 'int'`

Find the **mistake** in the code. Hint: Something is missing. Point out **what** is missing and **where**.

```
def fibonacci(n):
    if n <= 1:
        return 1
    else:
        fibonacci(n-1) + fibonacci(n-2)
```

In [ ]:

```

```

Problem 12

For the following code pieces **circle and label** the **base case** and the **recursive case**.

(a) Computing the powers of 2

```
def simple_recursion(n):
    if n <= 0:
        return 1
    else:
        return 2 * simple_recursion(n - 1)
```

(b) Print all elements in a nested list

```
def flatten_list(lst):
    if type(lst) == list:
        for i in lst:
            flatten_list(i)
    else:
        print(lst)
```

Problem 13

What is the **printed output** of the following code? (Hint: Drawing a recursion tree could help.)

```python
def func(x):
    print(x)
    if x >= 2:
        func(x-2)
    if x >= 3:
        func(x-3)

func(4)
```

In [ ]:

Problem 14

Write a function `sum_up(n)` to sum up the numbers from 1 to `n`. **Use recursion!**

NO for/while loops.

In [ ]:

Problem 15

Consider the number sequence defined as $s_0 = 1$ and $s_1 = 1$ and $s_n = n \cdot s_{n-1} + s_{n-2}$ for $n \geq 2$.

Write a function `sequence(n)` to compute s_n. **Use recursion!**

In [ ]: