Did you hear about the monkeys who shared an Amazon account?

They were Prime mates!

Source: https://www.rd.com/jokes/computer/

Thank you, Nicolas!

CMPT 120

Lecture 28 – Practice Exam 8 - SOLUTION

In-Class Activity

Course grading scheme on our course website: ***Best 7 in-class exercises out of 10: 1% each, for a total of 7%***

- Our in-class activity #8 -> 1%
  - Write your answer to questions **1,2,6,7** on the provided sheet of paper
  - Write your **lastname**, **firstname** and **student number**
  - At the end of today's class, hand in your sheet of paper in the appropriate pile:
    - **Pile 1** -> if your lastname start with a letter that is between '**A**' and '**L**'
      - **Pile 1** is on your **left-hand side** of the classroom
    - **Pile 2** -> if your lastname start with a letter that is between '**M**' to letter '**Z**'
      - **Pile 2** is on your **right-hand side** of the classroom

Theory and Understanding

Try to answer the questions **1st without using your computer,** then confirm your answer using IDLE!

Question 1

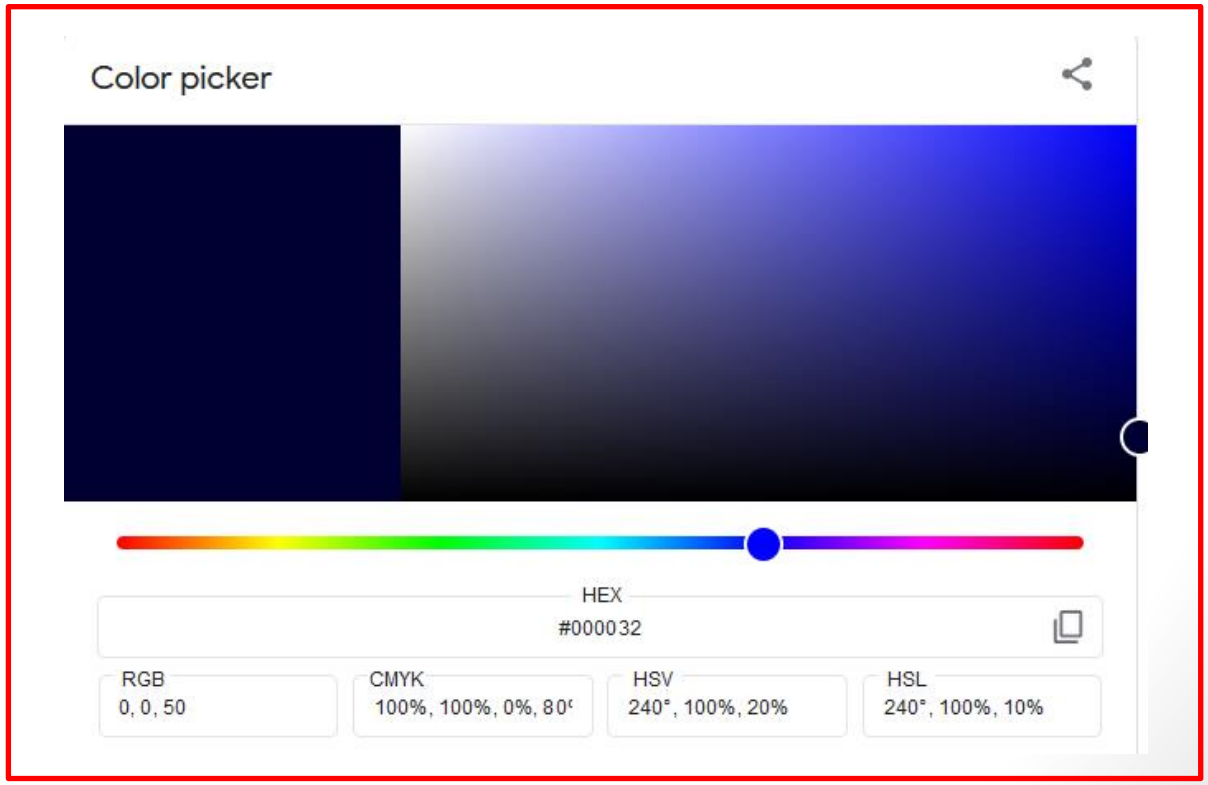
What colour would a pixel with RGB value (0, 0, 50) appear to be? Answer this question without using a color picker app online.

(A) Dark red
(B) Light red
(C) Dark green
(D) Light green
(E) Dark blue
(F) Light blue

Question 1

What colour would a pixel with RGB value (0, 0, 50) appear to be?

(A) Dark red
(B) Light red
(C) Dark green
(D) Light green
(E) Dark blue – nearly black:
(F) Light blue



Question 2

- Hand trace the code fragment below. What does it produce? To answer this question, show the content of the variable **grid**.

```
# Set variables
row = 5
column = 3
symbol = " - "
grid = list()
# Create a grid
for aRow in range(row):
    listRow = list()
    for aColumn in range(column):
        listRow.insert(aColumn, symbol)
    grid.insert(aRow, listRow)
```

```
[[' - ', ' - ', ' - '], [' - ', ' - ', ' - '], [' - ', ' - ', ' - '], [' - ', ' - ', ' - '], [' - ', ' - ', ' - ']]
```

Question 3

- Hand trace the code fragments below. What do they produce on the computer monitor screen?

Code Fragment 1:

```
print(grid)
```

Code Fragment 2:

```
for aRow in range(row):
    print(grid[aRow])
```

Code Fragment 3:

```
# Print the list using join() method
for aRow in range(len(grid)):
    print( '  '.join(grid[aRow]))
```

Question 3 - Solution

Take 1:

```
print(grid)
```

```
[[' - ', ' - ', ' - '], [' - ', ' - ', ' - '], [' - ', ' - ', ' - '], [' - ', ' - ', ' - '], [' - ', ' - ', ' - ']]
```

Take 2:

```
for aRow in range(row):
    print(grid[aRow])
```

```
[' - ', ' - ', ' - ']
[' - ', ' - ', ' - ']
[' - ', ' - ', ' - ']
[' - ', ' - ', ' - ']
[' - ', ' - ', ' - ']
```

Take 3:

```
# Print the list using join() method
for aRow in range(len(grid)):
    print( '   '.join(grid[aRow]))
```

```
-   -   -
-   -   -
-   -   -
-   -   -
-   -   -
```

Question 4

```
bList = list("123")
print(bList)
bList = bList + ['4']
print(bList)
cList = list("123")
print(cList)
cList.append('4')
print(cList)
```

-> this print statement produces:

['1', '2', '3']

-> this print statement produces:

['1', '2', '3', '4']

-> this print statement produces:

['1', '2', '3']

-> this print statement produces:

['1', '2', '3', '4']

Question 5

```
import random
                    A
def random_pie(pies):
  pie1 = random.choice(pies)
  pie2 = random.choice(pies)
  if pie1 == pie2:
    return (True, pie1, pie2)
  return (False, pie1, pie2)

# ***Main part of the program
B pies = ("blueberry", "apple", "pecan")
pie_answer = random_pie(pies)
if pie_answer[0]:
  print(f"You win a free {pie_answer[1]} pie!")
else:
  print(f"You get a 5% discount on either
          {pie_answer[1]} or {pie_answer[2]} pie!")
```

1. Is `pies` A and `pies` B the same variable?
2. If not, what is `pies` A? What is `pies` B?
3. What is the scope of `pies` A?
4. What is the scope of `pies` B?
5. What should we do to differentiate `pies` A and `pies` B?
6. What is the data type of the function's return value?

Answers in red ->

Question 5

```
import random
def random_pie(pies):
  pie1 = random.choice(pies
  pie2 = random.choice(pies
  if pie1 == pie2:
    return (True, pie1, pie
  return (False, pie1, pie2

# Main part of program
pies = ("blueberry", "apple
pie_answer = random_pie(pie

if pie_answer[0]:
  print(f"You win a free {pie_answer[1]} pie!")
else:
  print(f"You get a 5% discount on either
        {pie_answer[1]} or {pie_answer[2]} pie!")
```

A

B

1. Is `pies` A and `pies` B the same variable? **No, their values are stored in different memory locations**
2. If not, what is `pies` A? **parameter, variable local to random_pie function** What is `pies` B? **variable local to the main part of the program, used as an argument when calling the function random_pie**
3. What is the scope of `pies` A? **random_pie function**
4. What is the scope of `pies` B? **main part of the program, specifically, from its initialization to the end of main part of program**
5. What should we do to differentiate `pies` A and `pies` B? **Name them differently. For example: `pies` (A) vs `thePies` (B)**
6. What is the data type of the function's return value? **tuple**

Question 6

Given the image **raspberries.jpg** below, what does the following code output (approximately)?

```
from PIL import Image

rasp = Image.open("raspberries.jpg").load()
# raspberries.jpg is 800 x 534 pixels

print(rasp[5,400])
print(rasp[400,0][0])
print(rasp[200,100][0])
```

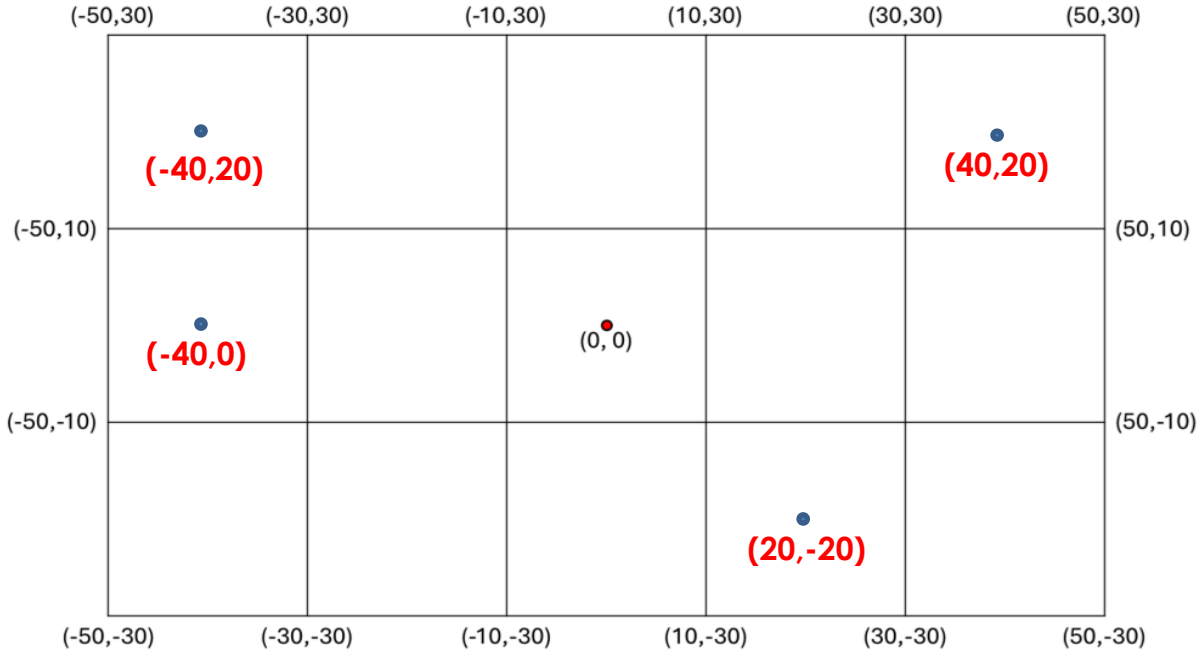
Answer:
(255, 255, 255) (this is white)
201 (this is the value of r)
224 (this is the value of r)

raspberries.jpg
Attribution: "Fir0002/Flagstaffotos"

Question 7

Below is a drawing of a possible maze from our Assignment 4. The maze below is quite simple: it is made of 3 rows and 5 columns. As we are doing our Assignment 4, we shall need to recompute the location of the turtle navigating the maze. To prepare us for this computation, consider the four blue dots representing various locations of our turtle in the maze. These four blue dots, along with the red dot, are at the centre of a cell.

1) What is the size of a cell? **20 x 20**
2) Compute as precisely as you can each blue dot's coordinates (column, row).



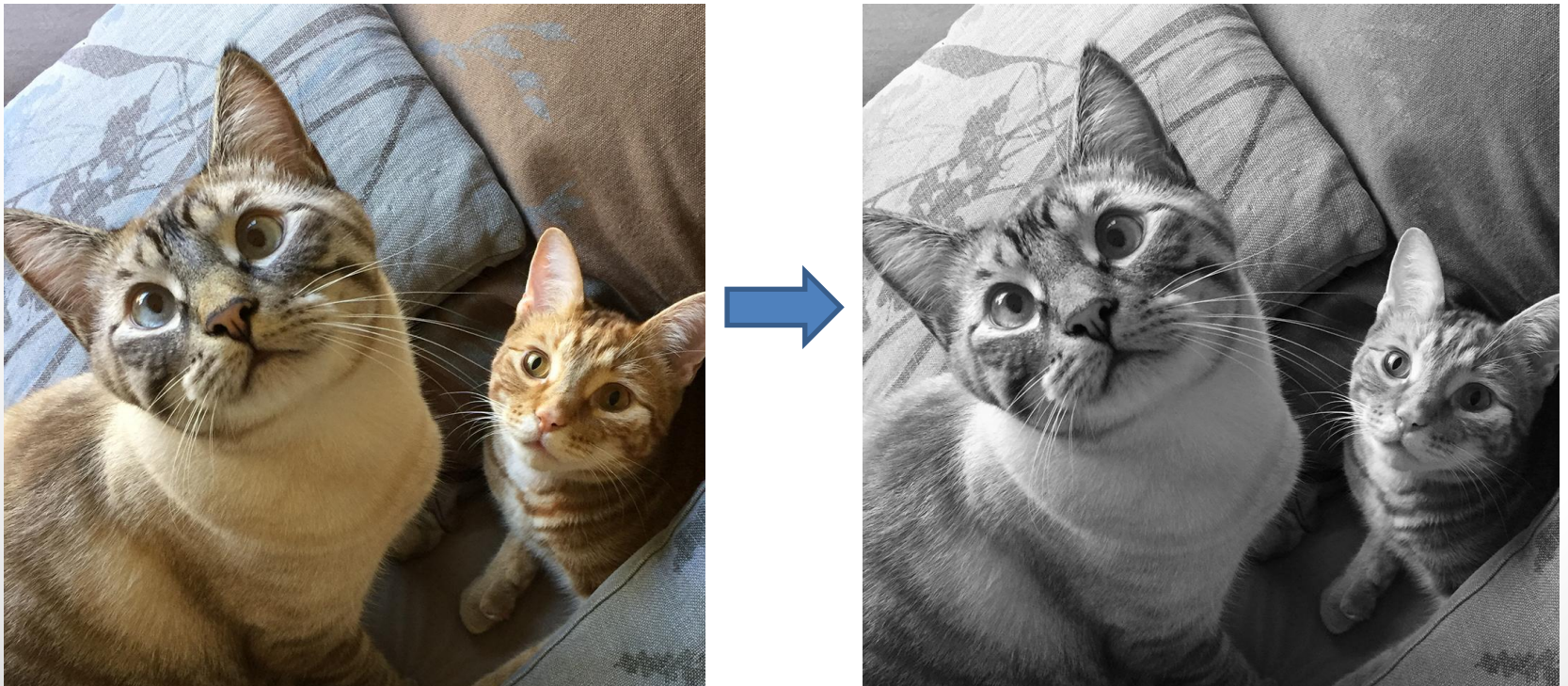
Coding

Try to solve the problem (i.e., write your Python program) **1st on a piece of paper without using your computer**!

Question 8

Step 1 – Problem Statement

Write a function that, given a pixel, returns the greyscale value of that pixel.



Question 8 – cont'd

Step 2 – Design

To create the greyscale value of a pixel one needs to average the pixel's rgb values:

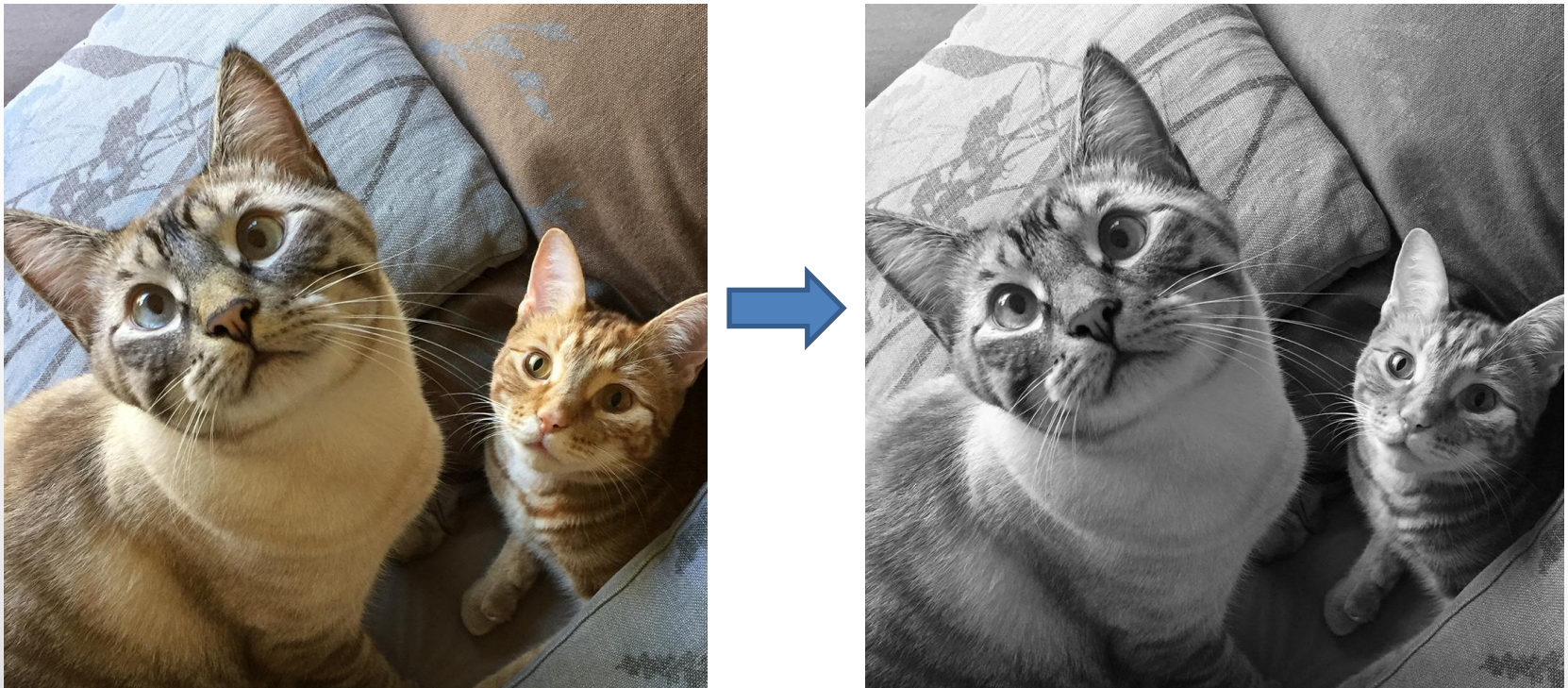
```
int((r+g+b)/3)
```

- Btw, why do we use parentheses around `r+g+b`? Why not using `int(r+g+b/3)`?

Question 8 – cont'd

Step 1 – Problem Statement – cont'd

Add your function to our `myColourModule.py` module, then use this module in a program that transforms a colour image into a greyscale image.



Question 8

Step 1 – Problem Statement – Partial Solution

Write a function that, given a pixel, returns the greyscale value of that pixel.

```
# average the rgb values to get greyscale values
newr = int((r+g+b)/3)
newg = int((r+g+b)/3)
newb = int((r+g+b)/3)

# make a new pixel
newpixel = (newr, newg, newb)

kitties_grey.putpixel((col,row), newpixel)
```