CSE 8A
Fall 2021
Midterm Exam

Total Possible Points: 32 (2 extra credit points included). There are 6 questions for this exam.

Score needed to achieve 100%: 30 points

This exam is closed book, closed notes. You can use any empty spaces on this paper as scratch and **you should write your answers clearly on the answer sheet**. You should tear off the answer sheet on the last page. All pages in this exam book must be turned in, including all the scratch papers we have provided.

By signing your name below, you are agreeing that you will not discuss any part of this exam with anyone who is not currently taking the exam in this room until after the exam grades have been returned. This includes posting any information about this exam on Edstem or any other social media. Discussing any aspect of this exam with anyone outside of this room constitutes a violation of the academic integrity agreement for CSE 8A.

Signature: _____

Name (please print clearly):_____

PID:_____

Your seat number: _____

DO NOT OPEN THIS EXAM UNTIL YOU ARE INSTRUCTED TO DO SO.

PLEASE STOP WRITING ON THE EXAM ONCE THE TIME IS UP. FAILURE TO DO SO WILL RESULT IN A 0 FOR THIS EXAM.

Functions from CSE8AImage libary

- `def load_img(filename): open an image file and return a grid of rgb tuples`
- `def save_img(img, filename): save a grid of rgb tuples as an image file`
- `def create_img(height, width, color): creates a blank grid of tuples of the given color. The grid is height by width`
- `def height(img): returns the height of the image (note you need to pass in a grid of tuples)`
- `def width(img): returns the width of the image (note you need to pass in a grid of tuples)`
- `def summarize(img): prints out the basic information of an image (note that you need to pass in a grid of tuples)`

- `def img_str_to_file(img, filename):` save a grid of rgb tuples into a file as text, not image.

1 (5 pts). Reference, object, and non-objects

Look at the following code and answer each question.

```
list1 = [1, 2, 3]
list2 = [4, 5, 6]
list3 = list1
list3[1] = 10
list2 = list1
list3 = [11, 12, 13]
```

a. How many objects are created by this code? _____

b. How many reference variables (not arrows) are created by this code? _____

c. What is the value for `list1[1]` at the end of code execution? If `list1` isn't pointing to any list, then just write NONE. _____

d. What is the value for `list2[1]` at the end of code execution? If `list2` isn't pointing to any list, then just write NONE._____

e. How many references (i.e. arrows) are pointing to list `[11, 12, 13]` at the end of the code? If `[11, 12, 13]` has no arrow pointing to it, just write NONE. _____

2 (5 pts). Memory models – part 1

Analyze the following code and write all the outputs. You may not need all the blanks on the answer sheet.

```
def foo():
    print("a")

def fubar(x):
    print(x)
    foo()

def bar(y):
    fubar(9)
    print(y)
    foo()

bar(12)
fubar(11)
```

3 (8 pts). Memory models – part 2

```
def guess(scores):
    size = len(scores)
    for i in range(size):
        if scores[i] > 5:
            scores[i] -= 2

def mystery(name):
    global length
    length = 7
    if len(name) > length:
        print("8a")
    else:
        print("8b")

values = [8, 11, 12, 30, 5, 3]

guess(values)
print(values)

person = "jane doe"
length = 8
mystery(person)
print(length)
```

a. When this code runs, how many stack frames are created? Include the global frame in your count but not the frames generated by built-in functions such as print._____

b. What is printed out by the code? You are given an exact number of slots for the printed result.

[_____, _____, _____, _____, _____, _____]

_____

_____

4 (3 pts). 2D list of tuples

```
image = [
  [(255, 255, 255), (0, 0, 255)],
  [(255, 255, 0), (0, 255,0)],
  [(255, 0, 0), (255, 255, 255)],
  [(0, 0, 0), (0, 255, 0)]
```

```
]
```

a. What is the value of `len(image[0])`? _____

b. What is the value of `len(image[0][1])`? _____

c. How many pure white pixels are there in this image? _____

5 (3 pts). Image Manipulation – part 1
Please complete the following function so that we create a 15 tall by 10 wide red box on the location specified by the parameter `r` and `c`. They indicate the upper left corner of the box. Location `(r, c)` is part of the 15 by 10 red box. Avoid off by one bugs.

```
from CSE8AImage import _______________

def redbox(img, r, c):
    for i in range(_______________):
        for j in range(_____________):
            img[i + r][j + c] = (255, 0, 0)
```

6 (8 pts). Image Manipulation – part 2
Please complete the following function so that we remove all the blueness from every pixel in the picture. Also answer the question about row major or column major.

```
def noblue(img):
    img_w = ____________
    img_h = ____________

    for _____ in range(img_w):
        for ______ in range(img_h):
            (r, g, b) = img[i][j]
            img[i][j] = (___, ___, ___)
```

Given the code above and assume the answer for the blanks are filled correctly, do we process the image in the row major format or column major format? Just write row major or column major in the blank. If we can't tell, just write NA.

_____

Scratch Paper

Scratch Paper

CSE 8A Midterm 2 – Answer sheet page 1

Name: _____ PID: _____

Problem 1 (5 pts): Reference, object and non-objects

a. _____ **b.** _____ **c.** _____ **d.** _____ **e.** _____

Problem 2 (5 pts): Memory models – part 1
You don't necessarily need all the blanks

_____

_____

_____

_____

_____

_____

_____

_____

_____

Problem 3 (8 pts): Memory models – part 2

a. _____

b.

[_____, _____, _____, _____, _____, _____**]**

_____

_____

Name: _____ PID: _____

Problem 4 (3 pts): 2D list of tuples

a. _____

b. _____

c. _____

Problem 5 (3 pts): Image manipulation – part 1

```
from CSE8AImage import _____

def redbox(img, r, c):

    for i in range(_____):

        for j in range(_____):

            img[i + r][j + c] = (255, 0, 0)
```

Problem 6 (8 pts): Image manipulation – part 2

```
def noblue(img):

    img_w = _____

    img_h = _____


    for _____ in range(img_w):

        for _____ in range(img_h):

            (r, g, b) = img[i][j]


            img[i][j] = (_____, _____, _____)
```

Row major, Column major, or NA

_____