CSE 8A: Intro to Programming in Python
Fall 2021

Lecture 17 - tuples and pictures

UC San Diego

Midterm Feedback

- Optional challenges
  - Discussion sessions
- More professor office hours (Thursday 10am – 11am)
- More worksheets
- Discuss PA a bit more
- Lab policy
  - lab quiz is timed but you can complete anytime on Thursday

Topics

- Tuple
- 2D list exercises
- Images

Tuples

An easy way to group a small number of things together

loc = (32, 49)

Memory model

Exercise: Tuples

What will happen when we run this code below?

```
loc = (12.83, 11.93)
a = loc[0]
b = loc[1]
b = 0
b = a
print(loc)
```

A) `(12.83, 11.93)` will be printed

B) `(12.83, 0)` will be printed

C) (0,0) will be printed

D) (12.83, 12.83) will be printed

E) Error: Tuples are immutable

Exercise: Tuples

What will happen when we run this code below?

```
loc = (12.83, 11.93)
loc[1] = 13.61
print(loc)
```

A) (13.61, 11.93) will be printed

B) (12.83, 0) will be printed

C) (0,0) will be printed

D) (12.83, 13.61) will be printed

E) Error: Tuples are immutable

Exercise: Tuples

What will happen when we run this code below?

```
loc = (12.83, 11.93)
(a, b) = loc
(b, a) = (a, b)
loc = (a, b)
print(loc)
```

A) (11.93, 12.83) will be printed

B) (12.83, 11.93) will be printed

C) (11.93, 11.93) will be printed

D) Error: syntax error

E) Error: Tuples are immutable

Coding Challenge: Variable Updates in Nested For Loops

Write a function that given a day of the week (0 - 4), returns the weather in the three cities (Miami, Cleveland, San Diego) on that day as a list.

```python
data = [[23, 24, 25, 27, 26],
        [0, -1, 1, -3, -2],
        [9, 10, 11, 12, 11]]

def get_a_days_weather(wdata, day):
    # write code here
```

```python
print(get_a_days_weather(data, 0))
[23, 0, 9]
print(get_a_days_weather(data, 2))
[25, 1, 11]
print(get_a_days_weather(data, 4))
[26, -2, 11]
print(get_a_days_weather(data, 5))
None
print(get_a_days_weather(data, -1))
None
```

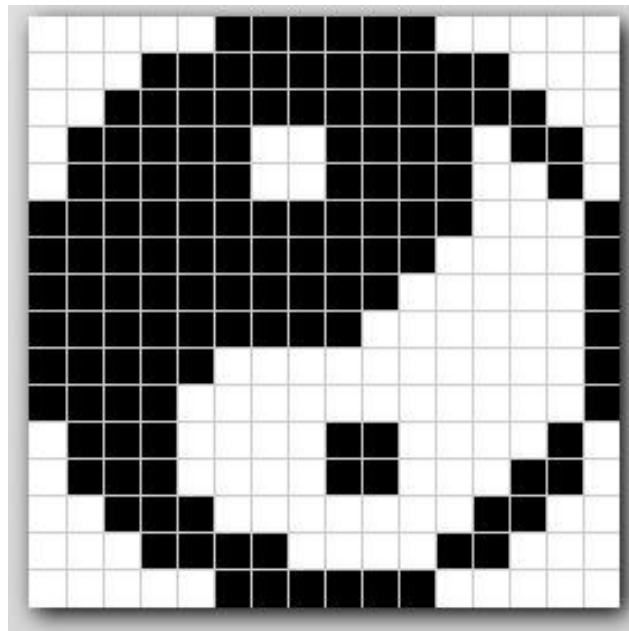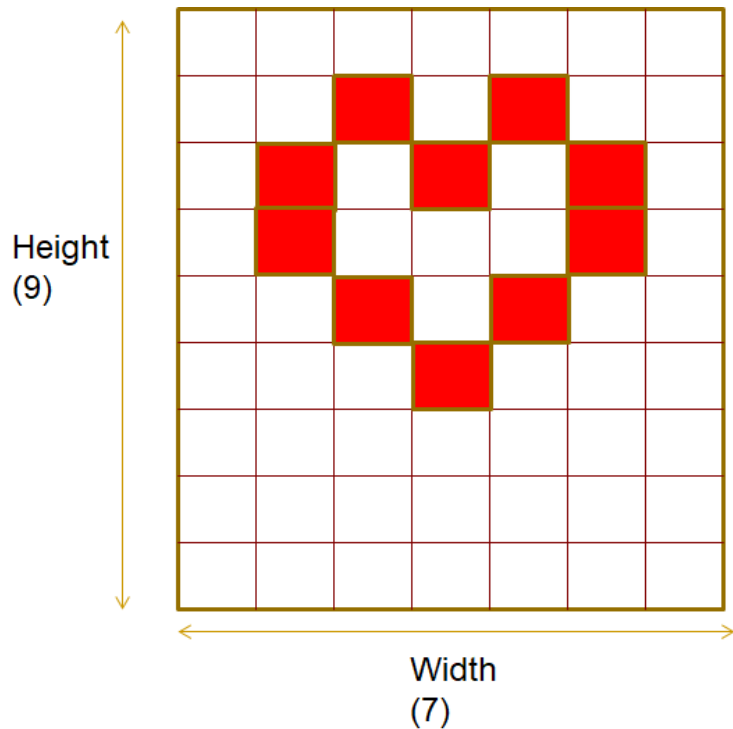# Coding Challenge: List of tuples and manipulating it

We have a list of students' lab scores. Please calculate the average of these students' lab scores and return it as a tuple. If the number of grades in a tuple is different from others, return None.

```
def calcAve(grades):
    # write code here
```
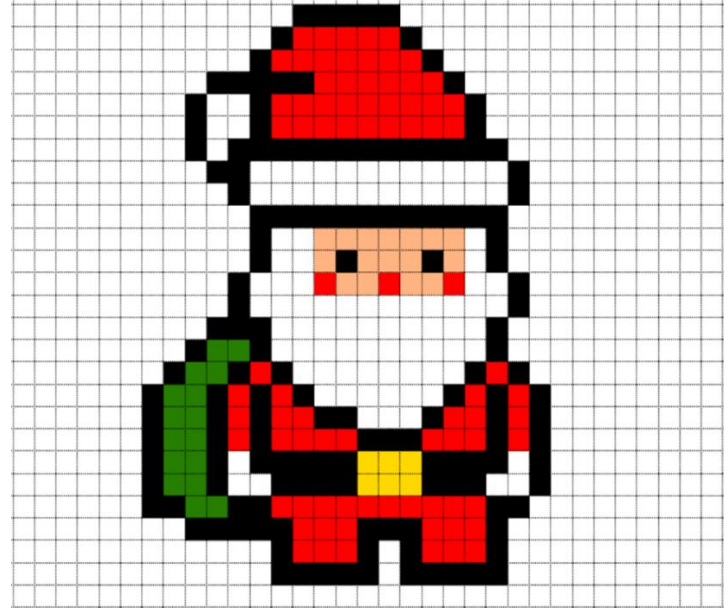
```
grades = [(99, 92, 92, 99),
          (32, 99, 10, 0),
          (100, 100, 0, 0)]

Your function should return
(77.0, 97.0, 34.0, 33.0)
```

Images as Pixels

Height
(9)

Width
(7)

Images as Pixels

Exercise: Basics of Images

What is this color?

R = 255, G = 0, B = 0

A) Red
B) Green
C) Yellow
D) Blue

Reference: https://www.colorschemer.com/color-picker/

Exercise: Basics of Images

What is this color?

R = 255, G = 255, B = 0

A) Red
B) Green
C) Yellow
D) Blue

Reference: https://www.colorschemer.com/color-picker/

Exercise: Basics of Images

What is the RGB value for Black?

A) 255, 255, 255

B) 0, 0, 0

C) 255, 0, 255

D) 0, 255, 0

Reference: https://www.colorschemer.com/color-picker/
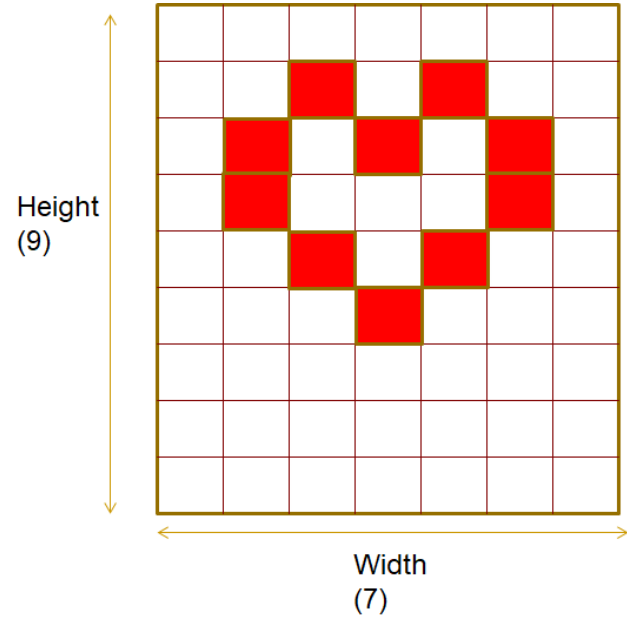
Exercise: Basics of Images

How many pixels are there in this image?

A) 9

B) 7

C) 10

D) 63

Exercise: Tuples

What will happen when we run this code below?

```
>>> orange = (255, 100, 0)
>>> r = orange[0]
>>> g = orange[1]
>>> b = orange[2]
>>> g = 0
>>> red = (r, g, b)
>>> red
```

A) (255, 100, 0) will be printed

B) (255, 0, 0) will be printed

C) (0, 100, 0) will be printed

D) Error: Tuples are immutable

Exercise: Tuples

What will happen when we run this code below?

```
>>> orange = (255, 100, 0)
>>> r = orange[0]
>>> g = orange[1]
>>> b = orange[2]
>>> g = 0
>>> orange = (r, g, b)
>>> orange
```

A) (255, 100, 0) will be printed

B) (255, 0, 0) will be printed

C) (0, 100, 0) will be printed

D) Error: Tuples are immutable

Exercise: Tuples

What will happen when we run this code below?

```
>>> orange = (255, 100, 0)
>>> r = orange[0]
>>> g = orange[1]
>>> b = orange[2]
>>> g = 0
>>> orange[1] = g
>>> orange
```

A) (255, 100, 0) will be printed

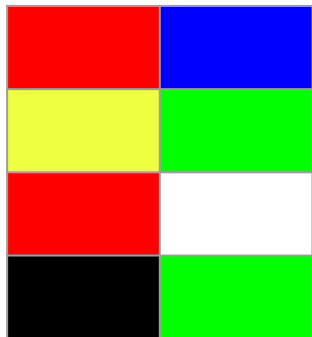B) (255, 0, 0) will be printed

C) (0, 100, 0) will be printed

D) Error: Tuples are immutable

Images as a 2d List of Tuples

Use the CSE8AImage library to read in the image as a 2D list

Each pixel is a tuple (r, g, b)

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

Exercise: Images as a 2d List of Tuples

How many pixels are there in the image below?

```
img = [[(0,0,0), (255,255,255)],
       [(255,0,0), (0,0,255)],
       [(0,255,0), (100,100,100)]]
```

A) 3   B) 6   C) 9   D) 18

Exercise: Images as a 2d List of Tuples

What is the height of the image?

```
img = [[(0,0,0), (255,255,255)],
       [(255,0,0), (0,0,255)],
       [(0,255,0), (100,100,100)]]
```

A) 2   B) 3   C) 4   D) 6

Exercise: Images as a 2d List of Tuples

What is the width of the image?

```
img = [[(0,0,0), (255,255,255)],
       [(255,0,0), (0,0,255)],
       [(0,255,0), (100,100,100)]]
```
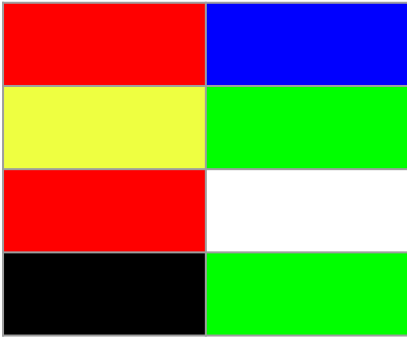
A) 2   B) 3   C) 4   D) 6

Exercise: Images as a 2d List of Tuples

What will be printed?

```
img = [[(0,0,0), (255,255,255)],
       [(255,0,0), (0,0,255)],
       [(0,255,0), (100,100,100)]]


print(img[1][1])
```

A) (0,0,0)   B) (0,0,255)   C) (255,255,255)   D) (255,0,0)

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

What is the memory model for 2D list of tuples?