Pictures

Images are made of grid of pixels. There is a width and height of the image.

- width: number of columns
- heigh: number of rows

Each pixel is a solid color. We use three values redness, blueness and greenness to represent its color.
Reference: https://www.colorschemer.com/color-picker/
- red (255, 0, 0) – green (0, 255, 0) – blue (0, 0, 255) – white (255, 255, 255) – black (0, 0, 0)
-shades of grey (a, a, a) where a is a value between 0 and 255

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)
B. (255, 0, 0)
C. (0, 100, 0)
D. Error: Tuples are immutable

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)
B. (255, 0, 0)
C. (0, 100, 0)
D. Error: Tuples are immutable

We provided a python file and it contains a few functions that you can use to process images. It is available in the edstem coding challenge. Let's take a look at it.

- `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.

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

- How many pixels are there in the image above?

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

- What is the height of the image?

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

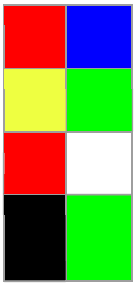
- What will be printed?

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

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

- What will be printed?

```
img[0] = img[1]
img[1][1] = (90, 90, 90)
print(img[0][1])
A) (90, 90, 90) B) (0,0,255)   C) (255,255,255) D) Error: tuples are immutable
```



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

Draw the memory model for this 2D list of tuples

Coding Challenge

Write a code that read in a picture bear.jpg and print out the basic statistics of the picture. Also save a copy of the picture as bear_copy.jpg. Statistics include: Width, Height, and the Number of pixels