CS 151 Fall 2010 at ISU, Exam 1 sample exam

Prepared by assistant professor Jeff Kinne on September 20, 2010. This sample exam hopefully gives you an idea of what to expect for the exam. You will have 50 minutes to take the exam. I will give you a copy of the latest version of my study sheet that you can use, but this and blank paper I provide are all you will have to use (no computer, textbook, notes, cellphone, calculator, etc.). This sample exam is slightly longer than the actual exam will be; while this sample has 12 questions, the real exam will have 9 or 10.

True/False (25 Points total) For each of the following, simply circle true or false.

Problem 1 (6.5 Points) True or False. When manipulating the pixels of a picture in JES, the maximum value for the red component of the pixel is 999 and the minimum value is 0.

Problem 2 (6.5 Points) True or False. The following function would correctly compute the average of all numbers from 1 up to 5. So the function computes and returns $(1+2+3+4+5)/5$.

```
def avg1to5():
  sum = 0
  for i in range(1, 5 + 1):
    sum = sum + i
  return sum/5
```

Problem 3 (6.5 Points) True or False. Entering the following into the JES command area will print the value 30.

```
>>> variable = "10"
>>> variable * 3
```

Problem 4 (6.5 Points) True or False. Assume there is a variable called pixel that is a pixel in a picture in JES. Then entering the following into the JES command area will correctly set the color of pixel to be red.

```
>>> setColor(pixel) = (255, 0, 0)
```

Multiple Choice (25 Points total) For each of the following, simply circle the correct answer (A, B, C, or D).

Problem 5 (6.5 Points) Which of the following functions correctly takes a picture that has been loaded into JES and makes the image grayscale.

(A)

```
def grayScale(pic):
  for p in getPixels(pic):
    avg = (getRed(p) + getGreen(p) + getBlue(p))/3
    setColor(p, makeColor(avg, avg, avg))
```

(B)

```
def grayScale(pic)
  for pixel in getPixels(pic):
    avg = (getRed(p) + getGreen(p) + getBlue(p))/3
    setColor(p, makeColor(avg, avg, avg))
```

(C)

```
def grayScale(pic):
  for p in getPixels(pic):
    avg = (getRed(p) + getGreen(p) + getBlue(p))
    setColor(p, makeColor(avg, avg, avg))
```

(D)

```
def grayScale(pic):
  for p in getPixels(pic):
    avg = (getRed(p) + getGreen(p) + getBlue(p))*3
    setColor(p, makeColor(avg, avg, avg))
```

Problem 6 (6.5 Points) Assume you have loaded the following function in JES.

```
def mystery(x1, x2):
  if (x1 < x2)
    return x2
  if (x2 <= x1)
    return 1
```

If you executed the command ">>> print mystery(5, 2)" in the command area, what value would be printed?
(A) 5 (B) 1 (C) 2 (D) 0

Problem 7 (6.5 Points) Which of the following commands would correctly display the total number of pixels in a picture that has been loaded into the variable named pic?

(A)

```
>>> print getWidth(pic) * getHeight(pic)
```

(B)

```
>>> print getWidth * getHeight
```

(C)

```
>>> print getWidth(pic)
```

(D)

```
>>> print getWidth(pic) / getHeight(pic)
```

Problem 8 (6.5 Points) Suppose the function times4Image has been loaded into JES, and times4Image takes a picture pic as its input and returns a picture that is the same width and height as picture but with 4 copies of the original within it (so each of the copies is half the width of the original and half the height). The function could be called from the command like this: ">>> newPic = times4Image(pic)". Suppose myPic is a picture that has been loaded into JES. Which of the following would correctly create a new picture with the same width and height as myPic but with 16 copies of the original myPic within it?

(A)

```
>>> myPic4 = times4Image(myPic)
>>> myPic16 = times4Image(myPic)
```

(B)

```
>>> myPic4 = times4Image(myPic)
>>> myPic16 = times4Image(myPic4)
```

(C)

```
>>> myPic16 = times4Image(myPic4)
```

(D)

```
>>> times4Image(times4Image(myPic)) = myPic16
```

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Short Answer   (25 Points total) For each of these questions, you are asked to explain some concept.

Problem 9   (12.5 Points) Explain how you could have JES take a picture and convert it into a picture that is black and white. *Note - you do not need to give the code, you only need to explain how. For example, if I asked "explain how to remove red eye", an acceptable answer would be something like "have a for loop that goes over all pixels in the picture; for each pixel look at the pixel and if it is very close to the red in the red eye, then change it to black".*

Problem 10   (12.5 Points) Explain how you could have JES create a picture that is a gradient from white to black as you go from top to bottom in the picture. That is, the first row would be all white pixels, the last row would be all black pixels, and the rows in between would be shades of gray that are lighter toward the top and darker toward the bottom. Explain how you would have JES do this - what loops you would use, what would happen inside the loop, etc.

Create a Program (25 Points total) For each of the following, you are asked to give code for a function to accomplish some task.

Problem 11 (12.5 Points) Give JES/Python code for a function that takes as input a picture and a number between 0 and 1 and multiplies the blue value of each pixel by that value. The first line of your function could be the following.

```
def lightenBlue(pic, value):
```

Problem 12 (12.5 Points) Assume you have a picture with pixels that only have the colors red, green, and blue. That is, the rgb values of any given pixel can *only* equal (255, 0, 0) or (0, 255, 0) or (0, 0, 255). Give JES/Python code for a function to change all of the blue pixels to be black while leaving the red and green pixels alone/unchanged. The first line of your function could be the following.

```
def changeBlueToBlack(pic):
```