

## Practice Midterm for CSC104

This is a sample midterm for CSC104 designed to help you prepare for the midterm on the first week of November.

### Question 1 (12 marks)

The following pieces of code are going to be used in four programs relating to sound in order to make them function as wanted according to the program description. The point where the line is inserted will be indicated by (missing line here:                   ). You are to determine which line of code belongs in which program, and write the number of that line of code in the space after the colon(:).

1. **for i in getSamples(input):**
2. **for i in range(0, getNumSamples(input)/2):**
3. **for i in range(0, getNumSamples(input)):**
4. **for i in range(0, getNumSamples(input) - getNumSamples(input)/3):**

**The first program** is supposed to find and return the maximum element that occurs in the first two thirds of a sound.

```
def maximumOfFirstHalf(input):
    maximum = -32678
    (missing line here:                   )
    maximum = max(maximum, getSampleValueAt(input,i))
    return maximum
```

**The second program** is supposed to mirror a sound, and return the mirrored sound.

```
def mirrorSound(input):
    length = getNumSamples(input)
    (missing line here:                   )
    value = getSampleValueAt(input,i)
    setSampleValueAt(input, length - i, value)
    return input
```

**The third program** is supposed to find and return the minimum element that occurs in a sound.

```
def minimumOfSound(input):
    minimum = 32677
    (missing line here:                   )
    minimum = min(minimum, getSampleValue(i))
    return minimum
```

**The fourth program** is also supposed to find and return the minimum element that occurs in a sound.

```
def minimumOfSoundAlternate(input):
    minimum = 32677
    (missing line here:                   )
    minimum = min(minimum, getSampleValueAt(input,i))
    return minimum
```

## Question 2 (12 marks)

The following four pieces of code are going to be used in two programs relating to pictures in order to make them function as wanted according to the program description. The point where the line is inserted will be indicated by (missing line here:                   ). You are to determine which line of code belongs in which program, and write the number of that line of code in the space after the colon(:) in the missing line statement.

1. `for i in range(0,getHeight(input)/2):`
2. `for j in range(0,getWidth(input)):`
3. `for i in range(0,getHeight(input)):`
4. `for j in range(0,getWidth(input)/2):`

**The first program** is designed to mirror the left half of the image onto the right half of the image. It will use side-effects to store changes.

```
def mirrorLeftToRight(input):
    width = getWidth(input)
    height = getHeight(input)
    variableOne = 0
    (missing line here :                   )
    variableTwo=0
    (missing line here :                   )
    startPixel=getPixelAt(input,variableOne, variableTwo)
    color =getColor(startPixel)
    pixel = getPixelAt(input,width -1 - variableOne, variableTwo)
    setColor(pixel,color)
    variableTwo= variableTwo + 1
    variableOne = variableOne + 1
```

**The second program** is designed to mirror the top half of an image onto the bottom half of the image. It will use side-effects to store changes.

```
def mirrorTopToBottom(input):
    width = getWidth(input)
    height = getHeight(input)
    variableOne = 0
    (missing line here:                   )
    variableTwo = 0
    (missing line here:                   )
    sourcePixel = getPixelAt(variableOne,variableTwo,input)
    color = getColor(sourcePixel)
    pixel = getPixelAt(input, variableOne, height-1-variableTwo)
    setColor(pixel,color)
    variableTwo= variableTwo + 1
    variableOne = variableOne + 1
```

**You can find solutions by running your guesses on pictures or sounds in Jython and seeing the output or errors. This process will benefit you more than me just providing answers.**

### Question 3 (12 marks)

In this question you will convert a number from one type to another.

1. 10110 from Binary to Base 10
2. 01110 from Binary to two's complement with 5 digits
3. 10111 from two's complement with 5 digits to base 10.
4. 16 from Base 10 to Binary
5. 12 from Base 10 to two's complement with 5 digits.
6. 01111 from two's complement with 5 digits to binary.

Each question is two marks, you may show work for partial credit. Clearly indicate which part you are working on, and circle your final answers.

#### **Question 4. (4 marks)**

In class we covered several important programming concepts. One of these was the idea of **hierarchical design**.

What is **one** potential **disadvantage** of Hierarchical Design **(1 mark)**?

List **two advantages** of Hierarchical Design **(2 marks)**:

Is hierarchical design something we should aim for or something we should avoid as programmers **(1 mark)**:

**Aim For**

**Avoid**

**(Circle the answer)**

**If you circle an answer and wish to change it scratch out the above and write your answer below, and circle your final answer.**