

# CSE 1321L: Programming and Problem Solving I Lab

## Assignment 3 – 100 points Solving Problems

What students will learn:

- 1) Problem solving
- 2) Structure programs to include conditional logic
- 3) Write code that includes if/else statements
- 4) Design programs that leverage switch/case logic
- 5) Solve problems of increasing complexity

**Overview:** For this assignment, you're going to practice making decisions in your code. It's because of those decisions that your program can behave differently depending on the values in your variables; these decisions are called **conditional statements**. In practical terms, this means you're going to expand on the concepts from assignment 1 and 2, but also include things like IF, ELSE IF, ELSE and SWITCH/MATCH statements. You'll also work with something called **compound conditionals**, which is just a fancy way of saying that you're going to use AND and OR operators (&& and ||). Again, start early, practice, and ask a lot of questions.

Follow the same conventions for class names and file names for your source code. For the Java folks, remove the "package" statement if you have one. Make sure to follow the [FYE Submission Guidelines](#). Finally, we don't mean to lecture, but we want to remind you [not to cheat](#). This is the core of what a lot of you will be doing for a living, so master it now.

### **Assignment3A:**

*Scrappy's Bucket List Rewards!* KSU has introduced a new incentive program to encourage student participation in campus events – Scrappy's Bucket List Rewards. Attending a certain number of events earns you fabulous KSU-branded prizes. You can see the full list here:

<https://www.kennesaw.edu/student-affairs/involvement/scrappys-bucket-list.php>

The reward structure is as follows:

Percentage	10%	25%	50%	75%	100%
Reward	Drawstring Bag	Hat	T-Shirt	Glass Water Bottle	Hoodie

Student Affairs has asked you to develop a program to calculate which reward(s) students should earn based on the number of events they've participated in. You will ask users how many events they have attended, and based on their response you will print out all the rewards they have earned. Additionally, if they have earned 100% of all rewards (out of 63 total events), you will ask them if they are graduating. If so, you will let them know that they've also earned a Challenge Coin and special Graduation Cords.

You must call the class **Assignment3A** and put it in a file called "Assignment3A.java", "Assignment3A.cs", or "Assignment3A.cpp"

Make sure to use *at least one* **nested IF statement** to complete this assignment. Your program should produce the following output based on different user input.

Sample Output #1:

*[Scrappy's Bucket List Rewards]*

How many events have you attended? **2**

Check out events at [https://studentaffairs.kennesaw.edu/scrappysbucketlist/!](https://studentaffairs.kennesaw.edu/scrappysbucketlist/)

Sample Output #2:

*[Scrappy's Bucket List Rewards]*

How many events have you attended? **7**

You've been to 11% of all SBL events!

You've earned a Drawstring Bag!

Sample Output #3:

*[Scrappy's Bucket List Rewards]*

How many events have you attended? **55**

You've been to 87% of all SBL events!

You've earned a Drawstring Bag!

You've earned a Hat!

You've earned a T-Shirt!

You've earned a Glass Water Bottle!

Sample Output #4:

*[Scrappy's Bucket List Rewards]*

How many events have you attended? **63**

You've been to 100% of all SBL events!

You've earned a Drawstring Bag!

You've earned a Hat!

You've earned a T-Shirt!

You've earned a Glass Water Bottle!

You've earned a Hoodie!

Are you graduating? **No**

There's a special reward when you graduate!

Sample Output #5:

*[Scrappy's Bucket List Rewards]*

How many events have you attended? **63**

You've been to 100% of all SBL events!

You've earned a Drawstring Bag!

You've earned a Hat!

You've earned a T-Shirt!

You've earned a Glass Water Bottle!

You've earned a Hoodie!

Are you graduating? **Yes**

Hooray, you earned a Challenge Coin and special graduation cords!

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### **Assignment 3B:**

*Image Color Depth:* In Assignment 1, we learned that each pixel of a computer image is represented with three values, RGB. If we add transparency, we would have RGBA ("A" for alpha channel). Traditionally one byte is used for each color, meaning that each pixel takes up 4 bytes of space. These are known as 8 bits per color channel encoding, or 8 BPC for short. More recently, encodings with larger ranges of color have become popular with artists and photographers. Programs like Photoshop now support 16 BPC and 32 BPC encoding.

For this assignment, you will try to determine the encoding of an RGBA image based on its width, height, and file size. After the user enters this information, you will first check if the information is valid. If not, you will notify the user and skip to the end of the program. (*Hint: You will have to check multiple potential issues with your IF statements*)

If the detail is valid, you will then calculate the BPC encoding. Based on the value, you will use a Switch statement to print out if the image is 8, 16, or 32 BPC. If it is outside the range, inform the user that your computer does not know how to read this encoding.

You must call the class **Assignment3B** and put it in a file called "Assignment3B.java", "Assignment3B.cs", or "Assignment3B.cpp". Make sure to use **Switch or Match statements** to complete this assignment – you will lose points if you do not.

#### Sample Output #1:

```
[Image Encoding Checker]
What is the image width? 10
What is the image height? -20
What is the file size (in bytes)? -200
```

*The information is invalid - please re-enter it.*

#### Sample Output #2:

```
[Image Encoding Checker]
What is the image width? 10
What is the image height? 20
What is the file size (in bytes)? 202
```

*The information is invalid - please re-enter it.*

#### Sample Output #3:

```
[Image Encoding Checker]
What is the image width? 50
What is the image height? 50
What is the file size (in bytes)? 10000
```

*The RGBA image is encoded with 8 bits per channel.*

#### Sample Output #4:

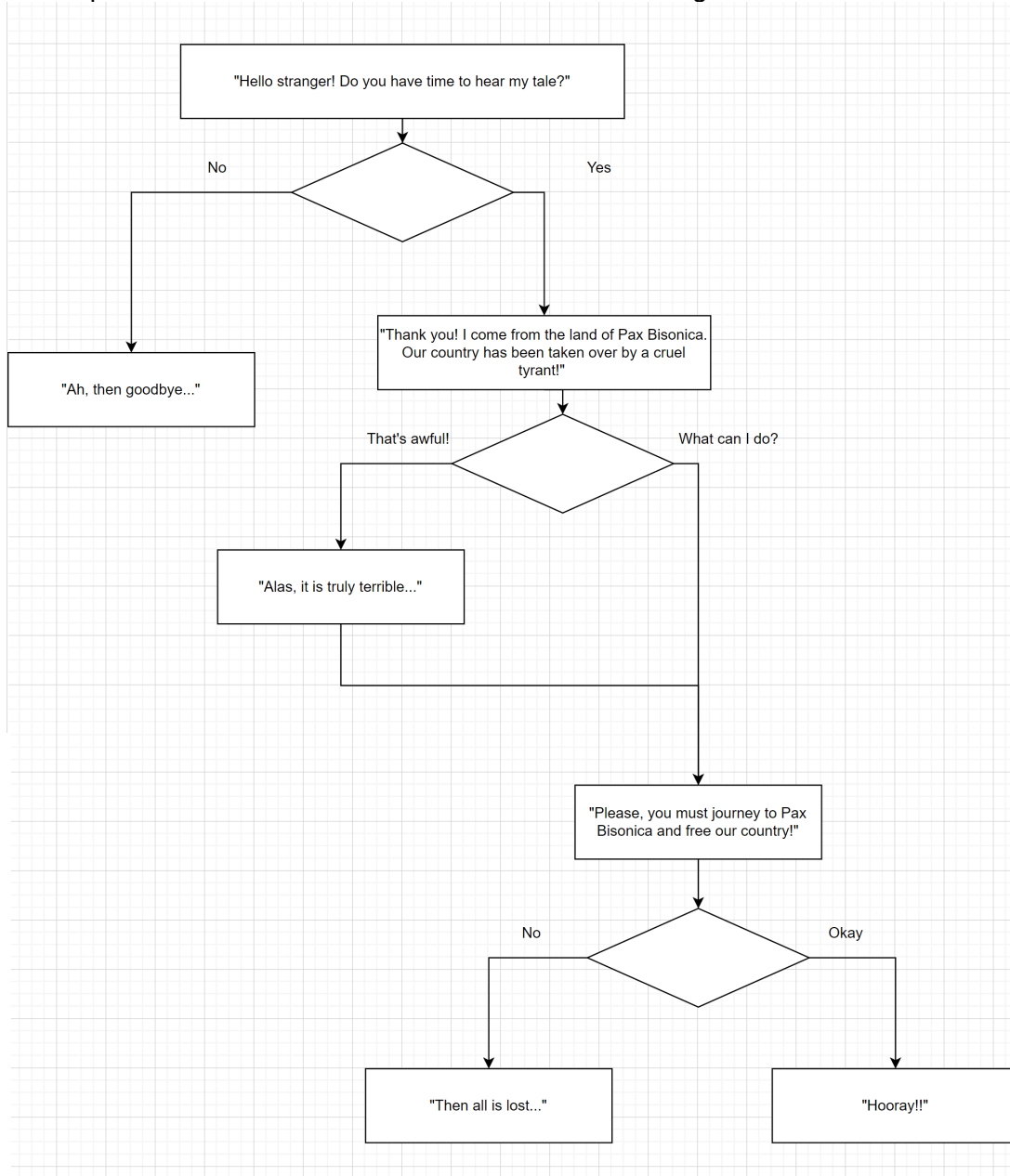
```
[Image Encoding Checker]
What is the image width? 100
What is the image height? 100
What is the file size (in bytes)? 80000
```

*The RGBA image is encoded with 16 bits per channel.*

### Assignment3C:

*Decision Trees:* Many video games and interactive stories use “decision trees” to allow for different dialogue based on the player’s choices. For this assignment, you will create a (basic) dialogue system using **NESTED IF** statements. The diagram on the next page shows the different choices you can make, and the appropriate responses.

**Note:** The following diagram is a simplified form of UML – Unified Modeling Language. It is one way to display an algorithm so that people can understand it and implement it in code. For our purposes, the boxes show the printed prompts and responses. The diamonds indicate decisions after each prompt. For example, if I respond “No” to the first prompt, my program should print the response shown at the end of the “No” line on the diagram.



You must call the class **Assignment3C** and put it in a file called "Assignment3C.java", "Assignment3C.cs", or "Assignment3C.cpp"

Make sure to use **nested IF statements** to complete this assignment. Your program should produce the following output based on different user input.

Sample Output #1:

```
[Epic Quest Simulator]
Hello stranger! Do you have time to hear my tale?
1) Yes
2) No
2
Ah, then goodbye...
```

Sample Output #2:

```
[Epic Quest Simulator]
Hello stranger! Do you have time to hear my tale?
1) Yes
2) No
1
Thank you! I come from the land of Pax Bisonica. Our country has been
taken over by a cruel tyrant!
1) That's awful!
2) What can I do?
1
Alas, it is truly terrible...
Please, you must journey to Pax Bisonica and free our country!
1) Yes
2) No
1
Hooray!
```

Sample Output #3:

```
[Epic Quest Simulator]
Hello stranger! Do you have time to hear my tale?
1) Yes
2) No
1
Thank you! I come from the land of Pax Bisonica. Our country has been
taken over by a cruel tyrant!
1) That's awful!
2) What can I do?
2
Please, you must journey to Pax Bisonica and free our country!
1) Yes
2) No
2
Then all is lost...
```

## Submission:

1. You will submit 3 separate files containing source code – one for each of the assignments above. Make sure the files are named correctly and to include the header with your name and course section listed.
2. Upload all 3 files (simultaneously) to the assignment submission folder in [Gradescope](#).
3. We'll continue to work with you on this assignment if something messes up, so long as you submit by the due date. However, start early because we work during the weekday.

## APPENDIX – Examples of testing string equality in Java, C# and C++

```
//===== Java =====  
import java.util.*;  
class Assignment3 {  
    public static void main(String[] args) {  
        Scanner scan = new Scanner (System.in);  
        String userInput;  
        System.out.println ("Enter something:");  
        userInput = scan.nextLine();  
        if (userInput.equals("Bob")) {  
            System.out.println ("You typed Bob");  
        }  
        else {  
            System.out.println ("You didn't type Bob");  
        }  
    }  
}
```

```
//===== C# =====  
using System;  
class Assignment3 {  
    public static void Main (string[] args) {  
        string userInput;  
        Console.WriteLine ("Enter something:");  
        userInput = Console.ReadLine();  
        if (userInput.Equals("Bob")) {  
            Console.WriteLine ("You typed Bob");  
        }  
        else {  
            Console.WriteLine ("You didn't type Bob");  
        }  
    }  
}
```

```
//===== C++ =====  
#include <iostream>  
#include <cstdlib>  
#include <string>  
  
using namespace std;  
  
int main() {  
    string userInput;  
    cout << "Enter something:" << endl;  
    getline (cin, userInput);  
    if (userInput.compare("Bob") == 0) {  
        cout << "You typed Bob" << endl;  
    }  
    else {  
        cout << "You didn't type Bob" << endl;  
    }  
}
```