HW#5

Computer Science: Program Your Own RPG

Instructions: Complete as much as you can in one hour and then stop. (Do your best.)

1. Pixels are represented as a sequence of bits in a computer. In the game we've been building images are drawn to the screen using the BufferedImage class (java.awt.image.BufferedImage). This class provides the following methods for getting and setting individual pixels:

```
public int getRGB(int x, int y)          //Gets the color at coordinate x, y
public int setRGB(int x, int y, int RGB)  //Sets the color at coordinate x, y to RGB
```

The format of the color (RGB) is 256,Red,Green,Blue. The higher the number is, the greater that color shows. Here are some examples:

0xFFFF0000 = Red, 0xFFFFFF00 = Yellow, 0xFFFF00FF = Purple

The "0x" in front of each number tells the computer that we are typing a hexadecimal number. Orange is Red plus half as much green. To mix white with a color we raise the value of any missing colors. Find the colors/numbers missing below:

0x_____ = Blue, 0x_____ = Orange, 0xFFFF6666 = _____
0xFFFFFFFF = White, 0x_____ = Black, 0xFF0000FF = _____
0xFF666666 = _____

2. Old gaming systems didn't have enough computing power to represent each color with 32 bits. Instead they used an 8 bit format: RRRGGGBB. Here are some examples:

0b11100011 = Purple, 0b11111111 = White, 0b00000011 = Blue:

The "0b" in front of each number tells the computer that we are typing a binary number. Find the colors/numbers missing below:

0b_____ = Green, 0x_____ = Red, 0b00000000 = _____
0b_____ = Yellow, 0x_____ = Light Blue, 0x11101100 = _____

3. Characters are often represented using 8 bit ASCII values, some of which are given in the following table:

A	B	C	D	E	F	G	H	I	J	K	L	M
0x41	0x42	0x43	0x44	0x45	0x46	0x47	0x48	0x49	0x4A	0x4B	0x4C	0x4D
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
0x4E	0x4F	0x50	0x51	0x52	0x53	0x54	0x55	0x56	0x57	0x58	0x59	0x5A

A CIA agent has intercepted a secret message sent from a computer. She needs a computer scientists help to decode the message. Decode the following string stored as bits:

1001000010001010100110001001100010011110101011101001111010100100100110001000100

Congratulations that is the end of the homeworks! At this point, you may be thinking, "what will I do without this class? I feel lost without fun computer science homeworks!" Ah, but do not fret young *padawan*. Below is a list of suggestions for how to continue having fun in computer science:

- Join ISU's Computational Thinking Competition in 2015. Winners in the past got a free laptop!
- Develop games for Android devices and smart phones. (All you need is some Java!)
- Try a more difficult programming language. Examples include:
  - C or C++ (Learn more about imperative languages and memory management.)
  - Haskell or ML (Learn functional languages used in proof assistants.)
  - MIPS or AVR (Learn assembly code to understand how to make your applications fast.)
  - Verilog HDL or VSIC HDL (Learn how to describe hardware and program FPGAs.)
- Of course you can always try some easier, popular languages:
  - HTML, CSS, JavaScript, and PHP (Scripting languages used for websites.)
  - C# (An imperative language that is very similar in syntax to Java.)
  - Python (Becoming very popular.)
- Also, don't forget to do well in school. The following subjects are especially important:
  - Math and Statistics (For any job in game design, computer science, or engineering.)
  - English language (For computer scientists, it is important to understand what it means to be a language, including what grammar and syntax is, for creating programming languages.)
  - Other sciences or electives (Computer scientists work in a wide range of domains and fields. All scientists rely heavily on computers. Other areas of academia including art, music, and literature are also increasingly using computers.)
- Join high school clubs that offer programming competitions, such as FBLA.
- Learn about the scientists who created computer science:
  - Ada Lovelace: First programmer. (Computers did not exist so her program was highly theoretical!) There is also a programming language named after her.
  - Alan Turing: "Father" of Computer Science. Created the concept of the Turing Machine, the Turing Test, and with Alonzo Church discovered the Halting Problem.
  - Grace Hopper: Invented the first compiler.
  - John Von Neumann: Alan Turing's advisor, and pioneer of modern computer architecture.

- Finally, if nothing else seems interesting, *make something fun*. Programming is a way to bring your thoughts and ideas to life. Use this gift to make something cool that you can share with your friends.

Thank you for attending. I hope you had fun =).

Brian