Write your name below and indicate your role,

Project Manager (PM), Recorder (R)

Name _____ Role _____

Name _____ Role _____

Number Systems

Your Tasks (Mark these off as you go)

- ☐ Practice converting between number systems
- ☐ Have Ms. Pluska check off your tasks
- ☐ Write a program that prompts the user for input
- ☐ Write a program that converts a binary number to decimal
- ☐ Determine the number of digits in a number
- ☐ Write a program that coverts a base 10 number to binary
- ☐ Receive credit for the group portion of this lab

☐ Practice converting between number systems

Complete the following conversions. Show your work to the write so I can see your thinking.

Octal	Decimal
107	
125	

Decimal	Octal
142	
148	

Hex	Decimal
FA9	
42A	

Decimal	Hex
189	
344	

Decimal	Binary
32	
23	

Binary	Decimal
11001	
11100	

☐ Have Ms. Pluska check off your tasks before you continue

Before you continue have Ms. Pluska check off the above tasks

Do not continue until you have Ms. Pluska's (or her designated TA's)

signature _____

☐ Determine the number of digits in a number

Recall that the number of postional values required to represent any decimal number can be determined as follows,

positions = $\log_{10}$(base10Number)

Java does not hava a built in log base 2 operation. However, the number of postions required to represent a number in any base can be determined as follows,

Consider the number 32, which is also equal to 2^5, so,

$$32 = 2^5 = 2^{positions}$$

If we take the base 10 log of both sides,

$$\text{Log}_{10}(32) = \text{Log}_{10}(2^{positions})$$

$$\text{Log}_{10}(32) = positions * \text{Log}_{10}(2)$$

Rearranging, we see that the number of positions required to represent the number 32 in base 2 is,

positions = $Log_{10}(32)/Log_{10}(2)$

a. Write code that code be used to determine the number of digits in a base 10 number. b. Write code that code be used to determine the number of digits in a binary number

□ Write a program that prompts the user for input

Prompt the user to provide the base or number system that they are converting from, the base or number system that they are converting to, and the number they would like to convert. Be sure to store their responses in the appropriate variables.

```
public class NumberSystems {
    public static void main(String args[]) {
            Scanner input = new Scanner(System.in);









      }
}
```

Write a program that converts a binary number to decimal

Assume int binNum stores a binary number. Consider how you might convert the following binary number, 1110001. Use a loop to write code to convert binNum to decimal. Store the converted number in a variable called result.

```
public class BinToDecimal{

     public static void main(String args[]){









   }
}
```

☐ Write a program that converts a base 10 number to binary

Assume int base10 stores a base 10 number. Consider how you might convert the following base 10 number, 142 to binary. Use a loop to write code to convert base10 to binary. Store the converted number in a variable called result.

```
public class DecimalToBin{

     public static void main(String args[]){









   }
}
```

☐ Receive Credit for the group portion of this lab

Before you submit your lab have Ms. Pluska check off the above tasks

Do not continue until you have Ms. Pluska's (or her designated TA's) signature _____