1. List the complete reference-source information for where you found the EIA standard resistor value and tolerance information.

Answer:

http://www.electronics2000.co.uk/data/itemsmr/res_val.php

http://www.techweb.co.jp/Liveparts/STD_EIA-E_Value_e.html

http://www.logwell.com/tech/components/resistor_values.html

2. How was this reference discovered and where?

I have found this references using GOOGLE.com.

3. The constructor requires the initialization values for the nominal resistance and the tolerance when an object is instantiated to be a correct E-series resistance and tolerance combination. Describe how this was accomplished in your program design and implementation.

You can find next code in program:

```cpp
//instatiate two objects of class resistor.
Resistor Resistor1(330,1), Resistor2(200,2);
This code was used to check correct input.
if(nominalResistance >= 0 && nominalResistance <= 1000000){
        this->nominalResistance=nominalResistance;

    }else{
       cout << "Enter new nominal resistance for Resistor 1  must be >= 0 and <=1000000 :
";
    }

    if(tolerance != 1 && tolerance != 2 && tolerance != 5 && tolerance != 10){
            cout << "Enter new tolerance for Resistor 1 (enter 1,2,5 or 10) : ";
    }else{
       this->tolerance=tolerance/100;
    }
```

4. In the lab, you were required to provide mutator functions to change the nominal-resistance and tolerance values of a resistor object.

```cpp
void Resistor::setNominalResistance(double nominalResistance,bool value){
        if (value==true)
        {
                cout << "Call method setNominalResistance()\n" ;

        }
        this->nominalResistance=nominalResistance;
}

void Resistor::setTolerance(double tolerance,bool value)
{
        if (value==true)
        {
                cout << "Call method setTolerance()\n";
        }
        this->tolerance=tolerance/100;
}
```

```cpp
double Resistor::getNominalResistance(bool value)
{
        if (value==true){
                cout << "Call method getNominalResistance()\n";
        }
        return nominalResistance;
}
double Resistor::getTolerance(bool value)
{
        if (value==true)
        {
            cout << "Call method getTolerance()\n" ;
        }
        return this->tolerance*100;
}
```

a. Describe how this was accomplished so that the user could not enter an invalid nominal-resistance and E-series tolerance combination.

```cpp
This code was used to check correct input.
while(userInputResistance < 0 || userInputResistance > 1000000){
                cout << "Enter new nominal resistance for Resistor 1  must be >= 0 and
<=1000000 : ";
                cin >> userInputResistance;
        }

        while(userInputTolerance != 1 && userInputTolerance != 2 && userInputTolerance != 5
&& userInputTolerance != 10){
                cout << "Enter new tolerance for Resistor 1 (enter 1,2,5 or 10) : ";
                cin >> userInputTolerance;
        }
```

5.   Describe how this process was different and/or similar to how you implemented this validation in the class constructor.

It is the same implementation.

Program execution

```
Test user input:
Enter new nominal resistance for Resistor 1  must be >= 0 and <=1000000 : 5000
Enter new tolerance for Resistor 1 (enter 1,2,5 or 10) : 10
Call method setNominalResistance()
Call method setTolerance()
Enter new nominal resistance for Resistor 2 must be >= 0 and <=1000000: 32569
Enter new tolerance for Resistor 2 (enter 1,2,5 or 10) : 5
Call method setNominalResistance()
Call method setTolerance()
Call method getNominalResistance()

Nominal Resistance value for Resistor 1 = 5000 ohms
Call method getTolerance()
Tolerance for Resistor1 = 10%
Call method calculateMaximumResistance()
Maximum Resistance for Resistor 1 = 5500 ohms
Call method calculateMinimumResistance()
Minimum Resistance for Resistor 1 = 4500 ohms
Call method getNominalResistance()

Nominal Resistance for Resistor 2 = 32569 ohms
Call method getTolerance()
Tolerance for Resistor2 = 5%
Call method calculateMaximumResistance()
Maximum Resistance for Resistor 2 = 34197.4 ohms
Call method calculateMinimumResistance()
Minimum Resistance for Resistor 2 = 30940.5 ohms

Nominal Resistance value for Resistor 1 : 5000 ohms
Tolerance for Resistor1 : 10%

Maximum Resistance for Resistor 1 = 5500 ohms
Minimum Resistance for Resistor 1 = 4500 ohms

Nominal Resistance for Resistor 2 : 32569 ohms
Tolerance for Resistor2 : 5%
Maximum Resistance for Resistor 2 = 34197.4 ohms
Minimum Resistance for Resistor 2 = 30940.5 ohms

Test user input:
Enter new nominal resistance for Resistor 1  must be >= 0 and <=1000000 : 2013
Enter new tolerance for Resistor 1 (enter 1,2,5 or 10) : 1
Enter new nominal resistance for Resistor 2  must be >= 0 and <=1000000: 6980
Enter new tolerance for Resistor 2 (enter 1,2,5 or 10) : 3
Enter new tolerance for Resistor 2 (enter 1,2,5 or 10) : 6
Enter new tolerance for Resistor 2 (enter 1,2,5 or 10) : 9
Enter new tolerance for Resistor 2 (enter 1,2,5 or 10) : 5

Nominal Resistance value for Resistor 1 = 2013 ohms
Tolerance for Resistor1 : 1%
Maximum Resistance for Resistor 1 = 2033.13 ohms
Minimum Resistance for Resistor 1 = 1992.87 ohms

Nominal Resistance for Resistor 2 = 6980 ohms
Tolerance for Resistor2 : 5%
Maximum Resistance for Resistor 2 = 7329 ohms
Minimum Resistance for Resistor 2 = 6631 ohms
```