

## Engineering Models I

### Homework Assignment #6

#### Instructions:

1. **Show your work!**
2. It is fine to work with other students, but what you turn in must be your own work - not something copied from someone else.

**Problem 1:** Do this problem by hand in order to practice. Then double check your answer in MATLAB.

(a) What will the two *disp* statements produce?

```
a = 5; b = 6; c = 3;
if a > 3 && c < 7
    result = a + b*c;
elseif a > 1 && b == 3
    result = a*c;
elseif b == 5 || c < 5
    result = b-15;
end
disp('result = ');disp(result)
```

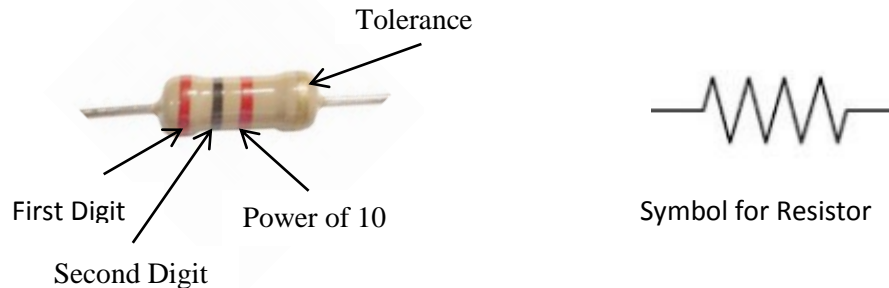
(b) What will the two *disp* statements produce?

```
a = 5; b = 6; c = 3;
if a > 3 && c < 7
    result = a + b*c;
end
if a > 1 && b == 3
    result = a*c;
end
if b == 5 || c < 5
    result = b-15;
end
disp('result = ');disp(result)
```

(c) Explain why the code in part (a) produces a different value for result than the code in part (b)

## **Problem 2: Resistor Value Calculator based on Color Code**

Figure 1 shows a picture of a resistor as well as the symbol used for a resistor in a circuit diagram.



**Figure 1: Resistor and Resistor Circuit Symbol**

The colored bands on the resistor can be used to identify the resistance. Each color corresponds to a number as shown in the table below.

| Resistor Color Code |                 |  |                                |           |
|---------------------|-----------------|--|--------------------------------|-----------|
| Color Bands 1-3     | Numerical Value |  | Color for 4 <sup>th</sup> Band | Tolerance |
| Black               | 0               |  | Missing                        | 20%       |
| Brown               | 1               |  | Silver                         | 10%       |
| Red                 | 2               |  | Gold                           | 5%        |
| Orange              | 3               |  |                                |           |
| Yellow              | 4               |  |                                |           |
| Green               | 5               |  |                                |           |
| Blue                | 6               |  |                                |           |
| Violet              | 7               |  |                                |           |
| Gray                | 8               |  |                                |           |
| White               | 9               |  |                                |           |

The nominal value of the resistor can be determined from the color bands on the resistor:

$$\text{Nominal Value of R} = (\text{FirstColorValue} * 10 + \text{SecondColorValue}) * 10^{\text{ThirdColorValue}}$$

The tolerance indicates how much the actual value of resistance can vary from the nominal value. The manufacturer's range for the resistor would then be:

$$\text{Range} = \text{Nominal Value} \pm \text{Tolerance} * \text{Nominal Value}$$

**Example:** Suppose the color bands on the resistor are YELLOW VIOLET ORANGE GOLD

$$\begin{aligned} \text{Nominal Value:} & \quad (4 * 10 + 7) * 10^3 = 47000 \, \Omega = 47 \, \text{k}\Omega \\ \text{Range:} & \quad 47 \pm 0.05 * 47 \, \text{k}\Omega \text{ or } 44.65 \text{ to } 49.35 \, \text{k}\Omega. \end{aligned}$$

(a) Write a script file to do the following:

- Prompt the user for the four colors on the resistor using menu statements
- Calculate the nominal value for the resistor and the range of resistance
- Display (fprintf) the nominal value and range in ohms if the nominal resistance value is smaller than 1000  $\Omega$ , in kohms if the nominal resistance value is at least 1000  $\Omega$  but less than 1,000,000  $\Omega$  and in Mohms if the nominal resistance value is 1,000,000  $\Omega$  or higher. Make sure to include units in your fprintf statements. Display two places behind the decimal point for range. Display zero places behind the decimal point if the resistance is in  $\Omega$  and display one place behind the decimal point if the resistance is in k $\Omega$  or M $\Omega$
- Test your script file using the YELLOW VIOLET ORANGE GOLD example from the previous page to make sure your program is working properly.

**Note: submit your script file along with this HW assignment**

(b) Run your script for the three cases shown in the table below and paste the output in the MATLAB Command window below the table.

| Color Band 1 | Color Band 2 | Color Band 3 | Tolerance Band |
|--------------|--------------|--------------|----------------|
| Gray         | Brown        | Black        | None           |
| Green        | Blue         | Red          | Silver         |
| Orange       | Orange       | Blue         | Gold           |

**Script Output for: Gray-Brown-Black-None**

**Script Output for: Green-Blue-Red-Silver**

**Script Output for: Orange-Orange-Blue-Gold**

**Remember: Submit your script file along with this HW assignment.**