General Instructions

Due Date:
Saturday, February 25 at 11:00pm (submit via blackboard)

Assignment Summary Instructions:
This assignment has three problems summarized below. You will use MATLAB as tool to solve the problems for the given test cases provided and that it is flexible for any additional test case that might be used to evaluate your code.

- Problem #1: Data Validation and Controls for Burner Efficiency
- Problem #2: Data Validation and Controls for Quarterly Costs and Production
- Problem #3: Data Validation and Controls for Resistor Decoding

Submission Instructions:
You will submit a **.zip file** that will contain the following files:

1. **.m file – Matlab file (separate sections using %% for each problem)**. Your final script should be in the zipped folder and named as **MA#_USERNAME.m (for example, MA4_dwburles.m).**
2. .pdf file - scan of your algorithm sheet (use the template) for Problem #1
3. .pdf file - scan of your algorithm sheet (use the template) for Problem #2
4. .pdf file - scan of your algorithm sheet (use the template) for Problem #3

Submit your **.zip file** to blackboard using the Mastery Assignment 1 link. Your final submission should be a zipped folder named as **MA#_USERNAME.zip (for example, MA4_dwburles.zip).** The file must be completely submit before 11pm on February 25 for credit. **No late work is accepted and will result in a zero on the assignment**. It is your responsibility to make sure the file is completely submitted prior to the deadline. You are provided 2 upload opportunities in case your first upload is incomplete or a mistake.

Academic Honesty Reminder:

The work you submit for this assignment should be your work alone. You are encouraged to support one another through collaboration in brainstorming approaches to the problem and troubleshooting. **However, all support should be only verbal in nature**. Sharing files and showing other students your file is considered physical and visual help and is considered an academic honesty violation.

Some examples of academic misconduct in ENGI 1331 include but are not limited to the following actions:

1. Picking up and using or discarding another student's written or computer output;
2. Using the computer account of another student;
3. Representing as one's own the work of another on assignments, quizzes, and projects;
4. Giving another student a copy of one's work on an assignment before the due date.
5. Copying work from online resources (Chegg, google forums, etc.)
6. Posting work to online resources where other students can view your work

This assignment will be checked for similarity using a MATLAB code. The similarity code will check each submission for likeness between other student submissions, past student submissions, the solution manual, and online resources and postings. If your submission is flagged for a high level of similarity, the ENGI 1331 faculty will review the files, and then the guilty parties will be turned in for an academic honesty violation if deemed appropriate.

NOTE: Since this is an automated system for all sections, if any of your work is not your own, you will be caught. Changing variable names, adding comments, or spacing will not trick the similarity algorithm and will result in a violation.

Problem #1

Background: *Please reference Problem #3 in MA1 for background information. You have been asked by your project lead to adapt your code to now to include the following data validations and controls:*

- *(Data Validation) If the user enters a negative time, ask the user enter a new time. Keep asking until the user enters a positive value.*
- *(Data Validation) If the burner efficiency is greater than 100%, warn the user that it is not possible and ask the user to enter a starting temperature. Keep asking the user for a new power until the efficiency is less than or equal to 100%.*
- *(Control) After you have entered all of the values and gotten your results, ask the user using a menu if they would like to enter new values for that brand name and model of stove. Use the Brand name and model of stove in your question. If yes, they should re-enter the initial room temperature of water, time it takes water to boil and power of the stove top burner again. This repeats until the user says no. In addition, change the title "Household Appliance Efficiency Calculator" to include the entry # (as shown in sample output). It should increase each time the use says yes to the re-entry menu.*

Algorithm Requirements:

- Create an updated algorithm with the modifications described above. It can be typed or by hand.
- Save or scan the file to a .pdf file and include in your final .zip submission

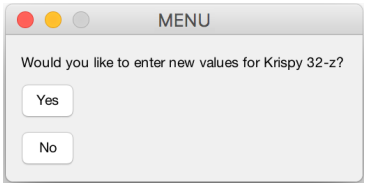
Coding Requirements:

- See Problem #3 in MA1
- NOTE: You many need to change the order of your input and output statements and/or your calculations in order to achieve the goals described. Use the sample output as a guide for the input and output statements.

Test Case Steps with Sample Output to Command Window (next page):

Follow these steps for the expected process and output

1. Enter a brand name and model of your stove: Krispy 32-z
2. Enter an initial room temperature: 68
3. Enter a time it takes water to boil: -10
    a. Program should ask again
4. Enter a time it takes water to boil: -5
    a. Program should ask again
5. Enter a time it takes water to boil: 21
6. Enter the power of the stove-top burner: 800
    a. Program should provide a warning and ask again
7. Enter the power of the stove-top burner: 1000
    a. Program should provide a warning and ask again
8. Enter the power of the stove-top burner: 1200
9. Select that you would like to repeat the program from the example menu (right)
10. Enter an initial room temperature: 69
11. Enter a time it takes water to boil: -50
    a. Program should ask again
12. Enter a time it takes water to boil: 18
13. Enter the power of the stove-top burner: 700
    a. Program should provide a warning and ask again
14. Enter the power of the stove-top burner: 750
    a. Program should provide a warning and ask again
15. Enter the power of the stove-top burner: 1500



Sample Output to Command Window

```
Type the brand name and model of your stove: >> Krispy 32-z

Household Appliance Efficiency Calculator: Entry #1

Type the initial room temperature of the water [deg F]: 68
Type the time it takes the water to boil [min]: -10
Please enter a positive time it takes the water to boil [min]: -5
Please enter a positive time it takes the water to boil [min]: 21
Type the power of the stove-top burner [W]: 800
Warning: The burner power you entered is not possible
Type the power of the stove-top burner [W]: 1000
Warning: The burner power you entered is not possible
Type the power of the stove-top burner [W]: 1200

Energy required:                1267909 J
Power used by burner:           1006 W

Burner efficiency for a Krispy 32-z stove: 83.9%



Household Appliance Efficiency Calculator: Entry #2

Type the initial room temperature of the water [deg F]: 69
Type the time it takes the water to boil [min]: -50
Please enter a positive time it takes the water to boil [min]: 18
Type the power of the stove-top burner [W]: 650
Warning: The burner power you entered is not possible
Type the power of the stove-top burner [W]: 700
Warning: The burner power you entered is not possible
Type the power of the stove-top burner [W]: 750
Warning: The burner power you entered is not possible
Type the power of the stove-top burner [W]: 1500

Energy required:                1259104 J
Power used by burner:           1166 W

Burner efficiency for a Krispy 32-z stove: 77.7%
```

Problem #2

Background: *Please reference Problem #2 in MA2 for background information. You have been asked by your project lead to adapt you code to now to include the following data validations and controls:*

1. *(Data Validation) After loading in the two data tables, check if the number of rows in the cost data set matches the number of rows in the volume data set **AND** that the volume table has four quarters. If one of those conditions is not true, tell the user to enter a new volume data set with the correct dimensions. The user will enter the data set directly, not by loading a new file. Indicate the dimension in the question. Keep asking until the user enters an appropriate matrix.*
2. *(Control) After you have run the program, ask the user if they would like to enter a new volume matrix. If yes, ask the user to enter a new volume matrix (using an input statement) then perform the data validation described above.*

Algorithm Requirements:

- Create an updated algorithm with the modifications described above. It can be typed or by hand.
- Save or scan the file to a .pdf file and include in your final .zip submission

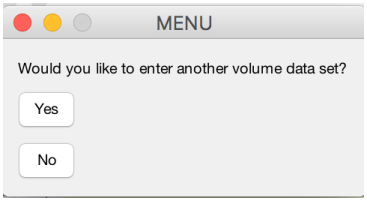
Coding Requirements:

3. See Problem #2 in MA2
4. NOTE: You many need to change the order of your input and output statements and/or your calculations in order to achieve the goals described. Use the sample output as a guide for the input and output statements.
5. NOTE: Output is in $ x 10^3.

Test Case Steps with Sample Output to Command Window (next page):

Follow these steps for the expected process and output

1. Run program using data provided for MA2.
2. Select "Yes" using the menu to the right.
3. When prompted using the size of matrices, enter the following matrix:
   a. [16 14 10; 2 12 15; 3 8 9; 4 14 13; 5 16 12]
   b. Program should ask again using size of matrix entered
4. When prompted using the size of matrices, enter the following matrix:
   a. [16 14 10 8; 2 12 15 12; 3 8 9 13; 4 14 13 14]
   b. Program should ask again using size of matrix entered.
5. When prompted using the size of matrices, enter the following matrix:
   a. [16 14 10 8; 2 12 15 12; 3 8 9 13; 4 14 13 14; 6 10 12 9]
6. Select "No" using the menu to the right.



Sample output to Command Window

```
Command Window

Quarter 4 was the highest costing quarter.

Material Costs: $364.00
Labor Costs: $214.00
Transportation Costs: $204.00
Overall Costs: $782.00

Product 4 was the highest costing product for the year.

Material Costs: $118.00
Labor Costs: $295.00
Transportation Costs: $236.00
Overall Costs: $649.00
Please enter another volume Data set that is 5 by 4:  >> [16 14 10; 2 12 15; 3 8 9; 4 14 13; 5 16 12]
You entered a 5 by 3. Please enter a new volume matrix that is 5 by 4:  [16 14 10 8; 2 12 15 12; 3 8 9 13; 4 14 13 14]
You entered a 4 by 4. Please enter a new volume matrix that is 5 by 4:  [16 14 10 8; 2 12 15 12; 3 8 9 13; 4 14 13 14; 6 10 12 9]

Quarter 4 was the highest costing quarter.

Material Costs: $291.00
Labor Costs: $176.00
Transportation Costs: $182.00
Overall Costs: $649.00

Product 3 was the highest costing product for the year.

Material Costs: $297.00
Labor Costs: $132.00
Transportation Costs: $165.00
Overall Costs: $594.00
```

Problem #3

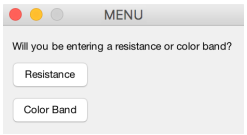
Background: *Please reference Problem #2 in MA3 for background information. You have been asked by your project lead to adapt you code to now to include the following data validations and controls:*

- *(Data Validation) When the user chooses resistance but enters a vector that has non-zero values after the first two digits, ask the user to enter another vector. After the 4th time asking and the user still has not entered an appropriate vector, produce a warning to the user and assume all values after the first two digits are zero values.*
- *(Data Validation) When the user chooses color band but enters an array that has more than three colors, ask the user to enter another array. After the 4th time asking and the user enters an array that is greater than 3, produce a warning to the user and assume the last 3 string entered are the colors. If the user enters an array less than 3, produce an error and terminate the program.*
- *(Controls) After the user has completes converting resistance to color band, ask the user if he or she would like to enter another resistance or color band. If yes, restart the program. If no, end the program and display how many times the program was run.*

Algorithm Requirements:
- Create an updated algorithm with the modifications described above. It can be typed or by hand.
- Save or scan the file to a .pdf file and include in your final .zip submission

Coding Requirements:
- See Problem #2 in MA3
- NOTE: You many need to change the order of your input and output statements and/or your calculations in order to achieve the goals described. Use the sample output as a guide for the input and output statements.

Test Case Steps with Sample Output to Command Window (next page):



Follow these steps for the expected process and output

1. Choose Resistance from the menu (top menu shown to the right)
2. Enter [2 6 2]
    a. Program should ask again
3. Enter [2 6 0]
4. Choose to run the program again from the menu (bottom menu shown to the right)
5. Choose Resistance from the menu (top menu shown to the right)
6. Enter [2 3 4 0 1]
    a. Program should ask again
7. Enter [4 5 3 0 0 2]
    a. Program should ask again
8. Enter [2 7 8 0 1 1]
    a. Program should give a warning then proceed
9. Choose to run the program again from the menu (bottom menu shown to the right)
10. Choose Color Band from the menu (top menu shown to the right)
11. Enter {'Black' 'Orange'}
    a. Program should ask again
12. Enter {'Black' 'Orange' 'Black'}
13. Choose to run the program again from the menu (bottom menu shown to the right)
14. Choose Color Band from the menu (top menu shown to the right)
15. Enter {'Black' 'Orange'}
    a. Program should ask again
16. Enter {'Black' 'Green'}
    a. Program should ask again
17. Enter {'Brown' 'Green'}
    a. Program should ask again
18. Enter {'Brown' 'Black'}
    a. Program should terminate with an error message

Sample Output to Command Window

Command Window

```
Converting Resistance to Color Band

Enter the resistance in ohms as a vector:  >> [2 6 2]
Enter an appropriate resistance in ohms as a vector:  [2 6 0]
The correct color band is: Red Blue Brown

Converting Resistance to Color Band

Enter the resistance in ohms as a vector:  [3 5 4]
Enter an appropriate resistance in ohms as a vector:  [2 3 4 0 1]
Enter an appropriate resistance in ohms as a vector:  [4 5 3 0 0 2]
Enter an appropriate resistance in ohms as a vector:  [2 7 8 0 2 1 1]
Warning: All values past the second positin are being assumed as 0
The correct color band is: Red Violet Green

Converting Color Band to Resistance

Enter the color band as a cell array (3 colors): {'Black','Orange'}
Enter the color band as a cell array (3 colors): {'Black','Orange','Black'}
The restistance for the given color band is 3.

Converting Color Band to Resistance

Enter the color band as a cell array (3 colors): {'Black','Orange'}
Enter the color band as a cell array (3 colors): {'Black','Green'}
Enter the color band as a cell array (3 colors): {'Brown','Green'}
Enter the color band as a cell array (3 colors): {'Brown','Black'}
Appropriate color band not entered
```