**ENED 1090: Engineering Models I**

**Homework Assignment #4**

**Due: Week of September 28th at the beginning of your Recitation Section**

**Problem 1: Indexing into 1-d Arrays & Conditional Statements**

Create a script file which does the following:

* Creates a vector t = [ -1 3 8 7 2 ]
* Uses an **if … else … end** conditional statement to determine if the first entry in t (i.e., t(1)) is negative. If the first entry is negative, add an fprintf statement to tell the user that t(1) is indeed negative. If the first entry is not negative, add an fprintf statement to tell the user that t(1) is non-negative. *Note: Obviously, you can look at t(1) and see that it is negative but you need to construct an if …. else statement to test t(1) in MATLAB!*
* Uses an **if … else … end** conditional statement to determine if the 2nd entry in t (i.e., t(2)) is between 6 and 10. If the 2nd entry is between 6 and 10, add an fprintf statement to indicate this. If not, add an fprintf statement indicating that the 2nd entry is not between 6 and 10. *Again, since the 2nd entry is 3, it obviously is not between 6 and 10, but you need to write a conditional statement that will determine this for you.*
* Uses an **if … elseif … else … end** conditional statement to determine if the 2nd entry is greater than the 4th entry, less than the 4th entry, or equal to the 4th entry. Include fprintf statements that display the values for t(2) and t(4) and the result (greater than, less than, or equal to). *Note: in your fprintf statement, don’t hardcode the values for t(2) and t(4), instead insert them. Something like this:*

*fprintf(‘t(2) = %i and t(4) = %i so … \n’,t(2),t(4)).*

**Run your script.**

**PASTE RESULTS HERE:**

**t(1) is negative**

**t(2) is not between 6 and 10**

**t(2) = 3 and t(4) = 7 so t(2) is less than t(4)**

**PASTE SCRIPT HERE:**

clear;clc;

t = [-1 3 8 7 2];

if t(1) < 0

fprintf('t(1) is negative\n');

else

fprintf('t(1) is non-negative \n');

end

if t(2) > 6 && t(2) < 10

fprintf('t(2) is between 6 and 10\n');

else

fprintf('t(2) is not between 6 and 10\n');

end

if t(2) == t(4)

equals = 'equal to';

elseif t(2) > t(4)

equals = 'greater than';

elseif t(2) < t(4)

equals = 'less than';

end

fprintf('t(2) = %i and t(4) = %i so t(2) is %s t(4)\n',t(2),t(4),equals);

**Problem 2: I/O statements & Conditional Statements**

In Homework #3, Problem 2, you wrote a script file that did the following:

* Prompted the user for Name, Age, City, State, and Zip Code using a series of input statements
* Used fprintf statement(s) to output the information entered by the user
* Used a menu statement to ask the user if the information entered is correct.

In this problem, you will build on that script file. Add a conditional statement (**if … else**) to your script file after the menu statement that accomplishes the following:

* If the user indicates that the information entered is correct, output a statement thanking or congratulating the user for entering the information correctly.
* Otherwise (else), add a menu statement with buttons for Name, Age, City, State, and Zip Code allowing the user to indicate which item was entered incorrectly.
* Add a conditional statement (**switch or if … elseif … elseif … elseif … else**) that prompts the user to re-enter the item that was entered incorrectly the first time. *Note: if the user messed up more than one item, they are out of luck until we learn while loops.*
* Right before the **end** of this conditional statement, repeat your fprintf statement(s) to output all of the information entered by the user.

**TEST CASE #1: Run your script and when asked if the information is correct, answer yes.**

**Paste the Resulting Output here:**

**What is your name? Kyle**

**What is your age? 18**

**What is your City? Cincy**

**What is your State? Ohio**

**What is your ZipCode? 44141**

**Name: Kyle**

**Age: 18**

**City: Cincy**

**State: Ohio**

**Zip Code: 44141**

**Congratulations for entering the information correctly!**

**TEST CASE #2: Run your script and when asked if the information is correct, answer no. When asked which item is incorrect, pick Name and enter a different (or corrected) Name.**

**Paste the Resulting Output here:**

**What is your name? Kyle**

**What is your age? 18**

**What is your City? Cincy**

**What is your State? Ohio**

**What is your ZipCode? 44141**

**Name: Kyle**

**Age: 18**

**City: Cincy**

**State: Ohio**

**Zip Code: 44141**

**What is your name? Karl**

**Name: Karl**

**Age: 18**

**City: Cincy**

**State: Ohio**

**Zip Code: 44141**

**TEST CASE #3: Run your script and when asked if the information is correct, answer no. When asked which item is incorrect, pick Zip Code and enter a different (or corrected) Zip Code.**

**Paste the Resulting Output here:**

**What is your name? Kyle**

**What is your age? 18**

**What is your City? Cincy**

**What is your State? Ohio**

**What is your ZipCode? 44141**

**Name: Kyle**

**Age: 18**

**City: Cincy**

**State: Ohio**

**Zip Code: 44141**

**What is your Zip Code? 23415**

**Name: Kyle**

**Age: 18**

**City: Cincy**

**State: Ohio**

**Zip Code: 23415**

**PASTE SCRIPT HERE:**

clear;clc;

name = input('What is your name? ','s');

age = input('What is your age? ');

city = input('What is your City? ','s');

state = input('What is your State? ','s');

zipcode = input('What is your ZipCode? ');

fprintf('Name: %s\nAge: %i\nCity: %s\nState: %s\nZip Code: %i\n',name,age,city,state,zipcode);

correct = menu('Is this information correct?','Yes!','No!');

if correct == 1;

fprintf('Congratulations for entering the information correctly!\n');

else

wrong = menu('Which piece of information is incorrect? ','Name','Age','City','State','Zip Code');

if wrong == 1;

name = input('What is your name? ','s');

elseif wrong == 2;

age = input('What is your age? ');

elseif wrong == 3;

city = input('What is your City? ','s');

elseif wrong == 4;

state = input('What is your State? ','s');

elseif wrong == 5;

zipcode = input('What is your Zip Code? ');

end

fprintf('Name: %s\nAge: %i\nCity: %s\nState: %s\nZip Code: %i\n',name,age,city,state,zipcode);

end

**Problem 3:**

In Engineering Foundations (1020), simple series and parallel circuits have been covered.

For two resistors (R1 and R2) in series:

* The total resistance is the sum of R1 and R2: Rtotal = R1 + R2
* The current through each resistor is the Applied Voltage divided by total resistance: IR1 = IR2 = I = Applied Voltage/Rtotal
* The voltage across each resistor is current times resistance: VR1 = R1\*I and VR2=R2\*I

For two resistors (R1 and R2) in parallel:

* The total resistance is: Rtotal = R1\*R2/(R1 + R2)
* The voltage across each resistor is the Applied Voltage: VR1=VR2=Applied Voltage
* The current through each resistor is the Applied Voltage divided by the resistance: IR1=Applied Voltage/R1 and IR2 = Applied Voltage/R2

Write a script that will do the following:

* Ask the user with a menu statement whether the circuit is series or parallel
* Prompt the user to enter the two resistor values (input statements)
* Prompt the user to enter the Applied Voltage.
* Use a conditional statement based on the menu choice (series or parallel), and calculate the total resistance, the current through each resistor, and the voltage across each resistor.
* Use fprintf statements to display the results. **Include units!**

**TEST CASE #1: Series Circuit, R1 = 810 Ohms, R2 = 560 Ohms, Applied Voltage = 15 V.**

**Paste the resulting output here:**

**What is the resistance of resistor #1? 810**

**What is the resistance of resistor #2? 560**

**What is the applied voltage? 15**

**Total resistance: 331.09Ohms**

**Current for Resistor #1: 1.851852e-02Amps**

**Current for Resistor #2: 2.678571e-02Amps**

**Voltage for Resistor #1: 15Volts**

**Voltage for Resistor #2: 15Volts**

**TEST CASE #2: Parallel Circuit, R1 = 810 Ohms, R2 = 560 Ohms, Applied Voltage = 15 V.**

**Paste the resulting output here:**

**What is the resistance of resistor #1? 810**

**What is the resistance of resistor #2? 560**

**What is the applied voltage? 15**

**Total resistance: 1370.00Ohms**

**Current for Resistor #1: 1.094891e-02Amps**

**Current for Resistor #2: 1.094891e-02Amps**

**Voltage for Resistor #1: 8.868613e+00Volts**

**Voltage for Resistor #2: 6.131387e+00Volts**

**PASTE SCRIPT HERE:**

clear;clc;

curcuit\_type = menu('What type of curcuit are you working with? ', 'Parallel', 'Series');

r1 = input('What is the resistance of resistor #1? ');

r2 = input('What is the resistance of resistor #2? ');

app\_volt = input('What is the applied voltage? ');

if curcuit\_type == 1

Rtotal = r1 + r2;

Ir1 = app\_volt/Rtotal;

Ir2 = app\_volt/Rtotal;

Vr1 = r1\*Ir1;

Vr2 = r2\*Ir2;

elseif curcuit\_type == 2

Rtotal = r1\*(r2/(r1+r2));

Ir1 = app\_volt/r1;

Ir2 = app\_volt/r2;

Vr1 = app\_volt;

Vr2 = app\_volt;

end

fprintf('Total resistance: %0.2fOhms\n Current for Resistor #1: %iAmps\n Current for Resistor #2: %iAmps\n Voltage for Resistor #1: %iVolts\n Voltage for Resistor #2: %iVolts\n',Rtotal,Ir1,Ir2,Vr1,Vr2);

**Problem 4: Under-Over 7 Dice Game**

Under-Over 7 is a very simple game played with two dice. The player simply bets on whether the sum of the two dice when rolled will be Under 7, Over 7, or Equal to 7.

Write a script that does the following:

* Includes this command: rng(‘shuffle’). This command randomly seeds the random function you will be using.
* Prompts the user (input statement) for how much money he/she wishes to wager
* Prompts the user (menu statement) to place his/her bet: Under 7, Over 7, Equals 7
* Rolls the dice: Dice1 = randi([1 6],1); Dice2 = randi([1 6],1); *Note: randi([1 6],1) creates one integer value in the range of 1 to 6.*
* Outputs to the user (fprintf) the value of each dice roll and the sum of the two rolls.
* Uses a conditional statement to determine if the user won or lost. If the user lost, use an fprintf statement indicating the loss. If the user won, use an fprintf statement indicating the win and the payout. The payout depends on the bet. If the player correctly bet Under 7 or Over 7, the payout is 1:1 (i.e., if I bet $1, I win $1). If the player correctly bet Equal 7, the payout is 4:1 (i.e., if I bet $1, I win $4).

**Run your script several times to test it.**

**PASTE ONE SAMPLE OUTPUT HERE:**

**How much money do you wish to wager? 50**

**Dice#1: 5**

**Dice#2: 5**

**Total: 10**

**You Lose**

**Money = $25.00**

**PASTE SCRIPT HERE:**

clear;clc;

rng('shuffle')

wager = input('How much money do you wish to wager? ');

bet = menu('Choose a value to bet on!','Over 7', 'Under 7', 'Equals 7');

dice1 = randi([1 6],1);

dice2 = randi([1 6],1);

fprintf('Dice#1: %i\n Dice#2: %i\n Total: %i\n',dice1,dice2,dice1+dice2)

if (dice1+dice2)>7 && bet == 1

outcome = 'You Win';

money = wager+wager;

elseif (dice1+dice2)<7 && bet == 2

outcome = 'You Win';

money = wager+wager;

elseif (dice1+dice2) == 7 && bet == 3

outcome = 'You Win';

money = wager+(wager\*4);

else

outcome = 'You Lose';

%If game=lost money is lost

money = wager-(wager/2);

end

fprintf('%s\n Money = $%0.2f\n',outcome,money)

**Turn In:**

**The word (or pdf) document with your plots, MATLAB commands, and answers to questions.**