LAB #5 – Finish Roman Numerals/Design

Remember, if you need to get Lab #4 graded, you need to show your **lab to the TAs within 10 minutes of getting to lab**, and you and your partner **will not receive lab credit if you do not get checked off** before leaving each lab. Once you have a zero on a lab, then it cannot be changed because we have no way of know if you were there or not!!!

Reminder: All of our labs involve paired programming. You do not have to keep the same partner for each lab, but you MUST work with someone in each lab!!! **First, find a partner for this lab.** It can be the same partner from the previous lab or a different partner.

New Labs: We are going to change the way we do labs by providing relevancy through videos and using larger group activities to encourage design, while utilizing a broader set of strengths. Each lab will begin with a 10-15 minute video shown on the TV by a TA, followed by a large group activity. The group activity requires design, input from everyone, and no computers!!!!

Learn how to be a good programmer:
https://www.youtube.com/watch?v=BjKmWk3oE4E

Each Pair: Implement Your Group Design (6 pts)

We need to split back into pairs, and each of the 5 pairs in a group need to implement the design from last week. Different pairs will finish at different times. After you get checked off by your project manager, please help the other pairs in your group. After everyone in the group has completed the program, then let your project manager know. We are curious how design influences the time spent on implementation.

Problem Statement: Design a program that converts a roman numeral into a decimal value and a decimal value into a roman numeral. Below are the specific rules and instructions for doing this.

Possible Roman Numerals:

1	5	10	50	100	500	1000
I	**V**	**X**	**L**	**C**	**D**	**M**

When a symbol appears **after a larger** symbol it is **added.**

- Example: VI = V + I = 5 + 1 = 6

If the symbol appears **before a larger** symbol it is **subtracted**. You can only use I, X, and C as a subtractor in front of a bigger numeral that is not more than 10 times bigger, i.e. I before V and X, X before L and C, and C before D and M are valid.

- Example: IX = X - I = 10 - 1 = 9

Don't use the same symbol more than three times in a row.

- Example: IIII is not how you represent 4, IV = V - I = 5 - 1 = 4

You should walk yourself through your design with the super bowl number **XLIX**
(L-X) + (X-I) is 40+9 = 49

Show your project manager (TA) how the super bowl number can be converted to and from roman numerals using your implementation. **After all pair's in a group has had their implementation approved by your project manager (TA),** we will look at how much code differs among the pairs within the same group using the same design versus among pairs in other groups. In addition, which group finished first, and what does their design look like?

Practice Designing as a Group (NO Computers Allowed!!!) (4 pts)

We need to get into a bigger group before you begin your paired-programming. Get into groups of 10 for a 30 person lab, i.e. 5 (or less) pairs in 3 different groups. Each group will have a dedicated TA as a project leader. The role of the TA is to make sure all members in the group are participating and that everyone understands the requirements of the problem being solved. In addition, your group might want to dedicate someone with good handwriting to capture your thoughts and design. Each group will begin by writing a flowchart for the solution, and then, write the pseudocode.

Problem Statement:
Take the current program and decide how you will break up the program into functions, each with a maximum of 10 lines of code. Draw boxes around blocks of pseudo-code you are deciding to modularize. You will need to make sure you check for good integers and roman numerals entered by the user.

- **What error handling functions will you use?**
- **How will main call these functions?**
- **What information will these functions need to share with main and other functions?**

Show your project manager (TA) how the super bowl number can be converted to and from roman numerals using your new design with functions. Trace the variables/values, as they are passed to functions and returned from functions.