Report
Week 3
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**Problem 1:**

**Understanding:**

We need to create a program that does the following:

1. Gets an input from the user
2. Uses a for loop and at function to print string one character at a time
3. Uses for loop to print string one character at a time in reverse direction
4. Uses a loop to count how many letter are in the word

**Design:**

1. Initialize string variable
2. Asks the use to enter a string: cout <<
3. Cin >> to let the user enter a string (that was my initial plan). However, during testing I've realized that if more than one word is entered, cin will not work. Cin reads only till it encounters a whitespace. I've used getline (cin, my_str) instead and that solved the problem.
4. To print string one character at a time, I'll use the following loop:
   ```
   for (int i = 0; i < my_str.length(); i++)
    {         cout << my_str.at(i) << endl;       }
   ```
5. To print string one characted at a time, I'll use the following loop:
   ```
   for (int i = (my_str.length()-1); i >=0 ; i --)
   {       cout << my_str.at(i) << endl;     }
   ```
6. To determine how many letters are there in a string, I was planning to use the following loop: for(int i =0; i < my_str.size();i++) { int length = i+1; }. This worked fine when one word was entered. However, if the string contained more than one word, there was a problem. All whitespaces were counted as letters as well.
7. My next step was to figure out how to count letters excluding characters.
8. I've made another for loop and if statement in the loop. This loops looks at each character in the string. If the character is a whitespace, the string.length() is decremented. If (my_str.at(i) == ' ') { numberOfChars--:}.

## Problem 2:

### UNDERSTANDING:

We need to write a program that reads person’s name in the following format:

FIRST, MILLDE, LAST NAME
OR
FIRST, MIDDLE INITIAL, LAST NAME

And outputs the following format:

LAST, FIRST NAME, MIDDLE INITIAL.

If the user does not have a middle initial/ middle name the output is: LAST, FIRSTS name.

### DESIGN:

Before starting this program, I came across Frank L Brasington’s code on the discussion board.
He used getline function in this program and the code looked extremely long and a little intimidating. At the same time, part of this question is to discuss to how solve this problem without using getline function. I’ve decided to do additional reading and came across cin.peek() function. I’ve decided that it can be very handy.

```
int main( )
 {
    //variable declaration
    string firstEntry, secondEntry, thirdEntry, combinedName;
```

The user will be asked to enter a name.
If user enters only TWO words, this is an indication that there is no middle name.
If user enters THREE words, this is an indication that there is a middle name.
I’ll use a cin.peek() function to determine whether 3rd word exists.

```
cin >> firstEntry >> secondEntry; // first and second words will be read by cin
```

Next I’ll do **if (cin.peek() != '\n')** to check if next entry is a new line character or some other character. If its not a new line, this is an indication that there is a third word, so there is a middle name.
First name is first entry; middle name is second entry and last name is third entry

```
    if (cin.peek()  != '\n')    {
```

```
  combinedName = thirdEntry + ", " + firstEntry + " " + 
secondEntry.at(0) + ". ";
       }
```

if 3rd word was not entered, we know that middle name does not exist,  thus, second word is the last name

```
       else {
        combinedName = secondEntry + ", " + firstEntry;
```

**Problem 3:**

**UNDERSTANDING:**

1. We need to find out how to use simple random number generator.
2. Print some random numbers using loop. The expectation is that we'll get the same numbers over and over
3. Try to fix the problem

**DESING:**

To generate random numbers I've used the following code.

```
    int i;
    for (i = 0; i < 10; i++)
    cout << rand( ) << endl;
    return 0;
```

I tried to run the program 5 times and kept getting the same numbers:

```
41
18467
6334
26500
19169
15724
11478
29358
26962
24464
```

My understanding is that if you run this program on the same computer, over and over, you'll be getting the same numbers. Thus, random number generators do not generate truly random number. This function produces pseudorandom numbers. Basically what happens a pre-defined sequence of numbers is generated. Once its generated for the first time, that sequence if fixed somewhere in the computer and any time you run the program same random number is generated. According to our book: a sequence of pseudorandom numbers is usually determined by one number known as the **seed (fixed parameter)**. If you start the random number generator with the same seed, over and over, then each time it will produce the same (random-looking) sequence of numbers.

To fix this, we can use srand () function to set the seed for the function rand. A good way to get a random seed is to use the time function because it changes every time you use it (time constantly goes forward). If I understood it right, when we are setting a seed from the seconds, if you launch your program twice within that second, your seed will be the same - hence producing the same result. However, if you launch your program next second, a different random number is generated.

```
int j;
 srand(time(NULL));
 cout << "Random numberes: \n";
 for (j = 0; j < 10; j++)
 {
     int random2 = rand();
     cout << random2 << endl;
 }
```

**Problem 4:**

**UNDERSTANDING:**

We need to write a program that takes 2 strings entered by the user and compares them. I should say that this description is very vague. So that’s what I am going to do.

1. Ask the user for string 1
2. Ask the user to string 2
3. Use == operator to compare strings. If they are identical, display a message that strings are identical. PLEASE NOTE THAT when == is used, its case sensitive, so string “mom” and string “MOM” will be considered to be 2 different strings.
4. If strings are different. Ill display a message that strings are different and list them in lexicographic order and let the user know which one is longer and which one is shorter.

**DESIGN**:

```
int main( )
    {
        string string1, string2;// strings declaration
        User is asked to enter string 1.
        getline(cin, string1); // console input string 1
        User is asked to enter string 2.
        getline(cin, string2); //console input string 2
         if ((string1) == (string2))// if strings are
identical. Please note that this comparison is case
sensitive. "MOM" and "mom" will be considered as
different strings
     { Display a message that strings are the same.  }
     else ( if strings are different)
     {
        Display a message that strings are different.
  Lexicographic order:
  Use    if (string1 < string2)     {     }
    else if (string1 > string2){ }
  Length difference:
Indicate how many characters are in each string.
Let the user know which one is shorter and which one is
longer.
    if (string1.length() > string2.length())    {…….}
    else {}
        return 0;
```

**Problem 5:**

**UNDERSTANDING:**

We need to write a program that:

1. Asks the use for an integer
    a. If character is entered instead of an integer – user gets an error message and is asked to reenter a number
    b. If decimal is entered, it will be converted to an integer
    c. Once the entry made by the user is accepted, it is assigned to the minimum and the user is asked for the second number
2. User is asked to enter the second number that has be higher than the first one. I am imposing a condition that it has to be at least ( first integer +10)

a. If the user enters a number that is too small – an error message is displayed and user is asked to reenter a number

b. If character is entered instead of an integer – user gets an error message and is asked to reenter a number

c. If decimal is entered, it will be converted to an integer

d. Once the entry made by the user is accepted – the user is asked for the second number

e. After the second number is accepted, it is assigned to be a maximum

3. Once we have a range min – man, a random number is generated within that range

**DESING:**

I need to include:
#include <iostream>, using namespace std; //Global statment
#include <cstdlib> to generate random number
#include <string> - I need this library in case string is entered

```
int main ()
{
   // variable declaration. User will be able to enter floating-point and integer values. If user enters a decimal, I’ll do a type cast to convert it to an integer. Please note that if the decimal is entered it will be truncated not rounded.
I need 4 variables: double min, double max, int min1, int max1;
```

For testing purposes, I want to have a  bool playAgain loop. This let the user start the program over at the end of the program. This is not required for this program, but I find it useful during the testing stage of the program.

So Ill set bool playAgain loop = true; This loop will be enetered if the user decides to play again.

```
  while (playAgain == true)
    {
        while (true) // loop to make sure that min entry is acceptable
```

```
            {
```

User will be asked to enter a number:

a. If character is entered, an error message will be displayed and user will be asked to reenter a number. I’ll use this loop to check for strings, characters, etc.

```
            if (cin.fail())
                        {
                           cin.clear();
                           string junk;
                           cin >> junk;
                           }
```

b. If double is entered, Ill do a type cast: min1 = static_cast<int> (min);

c. If the value entered by the user is acceptable, need to exit while loop: else {break};

Next user is asked to enter second number that will be maximum in the range.

I think I’ll do another while (true) loop{

User is asked to enter second number

a. If double is entered, Ill do a type cast: max1 = static_cast<int> (max);

b. If character is entered, an error message will be displayed and user will be asked to reenter a number. I’ll use this loop to check for strings, characters, etc.

```
            if (cin.fail())
                        {
                           cin.clear();
                           string junk;
                           cin >> junk;
                           }
```

c. If second number is < (min1 +10) – there is an “invalid number” message. User is notified that number is too small.

d. If the value entered by the user is acceptable, need to exit while loop: else {break};

Once minimum and maximum are accepted, random number needs to be generated within that range. I had no idea how to do that, so I had to do some additional reading. I came across this website: http://stackoverflow.com/questions/363681/generating-random-numbers-in-a-range-with-java

The following expression will be used to generate a random number between min and max : int myRand = rand() % (((max1 - min1) + 1) + min1);
At the end of the program, the user is asked if they want to repeat the random program, one more time. If they say yes, bool playAgain == true, is they say no, bool playAgain is changed to false.
This is not a project, so we do not need to have testing section. But I decided to include one cause this program took me a little longer than I expected.

**TESTING:**

| Testing | Input (tested conditions) | Expected conditions | Pass/Fail |
|---|---|---|---|
| First number: | character, string, etc | Invalid entry, asks to reenter # | pass |
| First number: | double | Accepted and changed to int type. | Pass. |
| Second number: | character, string, etc | Invalid entry, asks to reenter # | Pass |
| Second number: | double | Accepted and changed to int type. | Pass |
| Second number | Number < min | Invalid entry, asks to reenter # | Pass |
| Different numbers for first number and second number | Different numbers for first number and second number | Random number is within range of min - max | pass |