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**CMP 120L– Introduction to Computer Science I Lab**

**Lab 16**

**Exercise 1:**

Write a main program that declares a string of 120 characters, and fills it through the user’s input until user enters the newline (Enter) character. It then prints the total number of lowercase vowel characters (‘a’, ‘e’, ‘i’, ‘o’, ‘u’) present in the user’s input. It is assumed that the user input will be less than 120 characters.

***Sample Session: (User input in Red color)***

Enter a string: City of Sharjah

Number of lowercase vowels: 4

#include <iostream>

using namespace std;

void main()

{

char inp[120];

int x = 0;

cout << "Enter a string: ";

cin.getline(inp, 120);

for (int i = 0; inp[i]!='\0'; i++)

{

if ((inp[i] == 'a') || (inp[i] == 'e') || (inp[i] == 'i') || (inp[i] == 'o') || (inp[i] == 'u'))

{

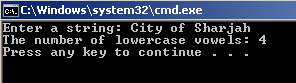
x++;

}

}

cout << "The number of lowercase vowels: " << x << endl;

}



**Exercise 2:**

Write and test the function

**void replace(char \*s, char from, char to);**

that changes all occurrences of the character *from* in the string **s** to character *to.* For example, if **s** were the string “steve”, and *from* = 'e' and *to* = 'a', then **s** would become "stava".

Write an appropriate main program to test the functionality of your function.

#include <iostream>

using namespace std;

void replace(char \*s, char from, char to);

void main()

{

char r[] = "steve";

cout << "The string before replacement: " << r << endl;

replace(r, 'e', 'a');

cout << "The string after replacement: " << r << endl;

}

void replace(char \*s, char from, char to)

{

int x = 0;

while (s[x] != '\0')

{

if (s[x] == from)

{

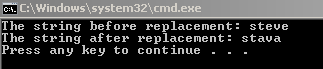
s[x] = to;

}

x++;

}

}



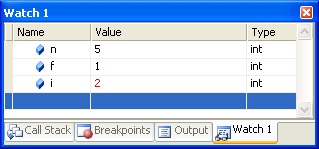
**Exercise 3:**

This exercise is aimed at using the debugger to **trace variable values**

**Steps to use debugger:**

1. Copy the code given below in fig 2 and compile it to check if it is error free.
2. After the program compiles without any errors, start the program execution in debug mode using **F10** key.(**F10** is step over key means that it executes program line by line. **F11** is step into key that can be used to step into functions or debug functions)
3. **F5** key must be used to run the program until the **next break point** is reached.
4. Setting a break point:
5. Place the cursor on the line at which the break needs to be set.
6. Click the right mouse button and select **Breakpoint -> Insert Breakpoint**
7. **Tracing variable values**
8. Select **Debug -> Windows ->Watch 1**
9. Enter the variable names that need to be traced in the window that opens up

Sample watch window for the variable n, f and i



**Fig 1**

**Part a:**

For the program given below in fig 2, execute it line by line and record the variable values of n, f and i before the start of the iteration through loop and for all the iterations of the loop and until the program terminates. You must use **F10** key to execute line by line and choose **n** value to be **5.** You can use the table format that is shown in fig 2 to record n, f and i values.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Variable values** | | |
| **Before entering loop** | **n** | **f** | **i** |
|  | **5** | **1** | **NULL** |
| **After Entering loop**  **(For all iterations)** | **n** | **f** | **i** |
| **1**  **2**  **3**  **:**  **:** | **5**  **5**  **5**  **5** | **2**  **6**  **24**  **120** | **2**  **3**  **4**  **5** |

**Part b:**

Set break point at line **20**. Run the program until the break point is reached using **F5**.

Step through the program from the break point using **F10** key and record the values of **n, f** and **i**.

|  |
| --- |
| #include <iostream>  using namespace std;  void main()  {  int n,fact;  cout <<"Enter the number :";  cin >>n;  if (n < 0)  {  cout << "Number must be >= 0 "<<endl;  return;  }  int f;  if(n==0 || n==1) f=1;  if(n>1)  {  f=1;  for (int i=2; i <= n; i++)  {  f \*= i;  }  }  cout<< "Factorial of " << n <<" is " << f << endl;  } |

**Fig 2**

|  |  |  |
| --- | --- | --- |
| n | f | i |
| 5 | 1 | 2 |
| **5** | **6** | **3** |
| **5** | **24** | **4** |
| **5** | **120** | **5** |
|  |  |  |

**Exercise 4:**

Given the following code:

#include <iostream>

using namespace std;

void main()

{

int x, y;

cout << "Please enter two numbers (x and y) : ";

cin >> x, y;

double z = x\*x\*x + 5;

y = y / (5 / 2);

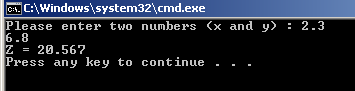
z = z + y;

cout << "Z = " << z << endl;

}

Try to run it, you will have a syntax error, fix it and run it again.

Test your program with 2.3 for x and 6.8 for y, you should have 19.887 as the result, what the result do have? Using the debugger, try to figure out the problems and fix them all, you should show us your work as screenshots.



#include <iostream>

using namespace std;

void main()

{

double x, y;

cout << "Please enter two numbers (x and y) : ";

cin >> x >> y;

double z = (x\*x\*x) + 5;

y = y / (5.0 / 2.0);

z = z + y;

cout << "Z = " << z << endl;

}

