 **COMSATS University Islamabad**

**Department of Computer Engineering**

**LAB #6**

**Programming Fundamentals**

**For and nested For Loops**

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**Objective:**

The objective of this lab is to teach the student how to declare variables of different to use for loops

**Lab task 1:**

Analyse the following for loops in the table and state whether (a) they compile (b) they run (c) They print out a line (d) they print out more than one line Answer each.

1. for (j = 1; j <=10; j++);

Compile: Yes

Run: Yes

Print 1 line: No

Print multiple lines: No

1. for (j = 1; j < 11;++j);

Compile: Yes

Run: Yes

Print 1 line: No

Print multiple lines:No

1. for (j = 1; j <=10; j++)

Compile:No

Run:No

Print 1 line:No

Print multiple lines: No

1. for (j = 1; j <= 10;j++) printf1 (“Hello\n”);

Compile: No

Run: No

Print 1 line: No

Print multiple lines:No

1. for (j = 1; j <= 10;j++); printf (“Hello\n”);

Compile: Yes

Run: Yes

Print 1 line: Yes

Print multiple lines: Yes

1. for (j = 1, j <= 10, j++) printf (“Hello\n”);

Compile: No

Run:No

Print 1 line: No

Print multiple lines: No

**Lab task 2:**

Write a program that input two integers x and y from the user. It display the table of x upto y e.g. if the user input as x = 2 and y = 3 then the program displays the following output

2 x 1 = 2

2 x 2 = 4

2 x 3 = 6

**Program:**

#include <stdio.h>

#include <stdlib.h>

int main()

{

int x; int y; int r;

printf("enter x: ");

scanf("%d", &x);

printf("enter y: ");

scanf("%d", &y);

for(int j=1;j<=y;j++){

r = x \* j;

printf("%d X %d = %d\n", x,j,r);}

return 0;

}

**Result:**

enter x: 6

enter y: 5

6 X 1 = 6

6 X 2 = 12

6 X 3 = 18

6 X 4 = 24

6 X 5 = 30

**Lab task 3:**

Write a program that determines the number entered by the user is even or odd.

After displaying the message (“Even” or “Odd”), it ask the user Do you want to enter another number (y/n). If the user enter y, it do the same process again otherwise exit. (Note: use do-while loop)

**Program:**

#include <stdio.h>

#include <stdlib.h>

int main()

{

int x=0;

char a;

identifier:

printf("enter a number: ");

scanf("%d", &x);

if(x%2==0)

printf("%d is even", x);

else

printf("%d is odd", x);

printf("\nDo you want to enter again (y/n): ");

scanf(" %c", &a);

switch(a){

case 'y':

goto identifier;

case 'n':

break;}

return 0;

}

**Result:**

enter a number: 6

6 is even

Do you want to enter again (y/n): y

enter a number: 9

9 is odd

Do you want to enter again (y/n): n

**Lab task 4:**

Write a program that input two integers x and y from the user. It calculates and then displays the x raise to power y (xy).

**Program:**

#include <stdio.h>

#include <stdlib.h>

int main()

{

int x; int y; int r;

printf("Enter an integer: ");

scanf("%d", &x);

printf("Enter the exponent: ");

scanf("%d", &y);

r = pow(x,y);

printf("%d^%d = %d", x,y,r);

return 0;

}

**Result:**

Enter an integer: 6

Enter the exponent: 5

6^5 = 7776

**Lab task 5:**

**Write down the output of the following program**

**for (int a=1;j=1; j<=5;j++)**

**for (i=1; i<=5;i++)**

**{**

**printf(“%d\n”,a);**

**a++;**

**}**

**Program:**

#include <stdio.h>

#include <stdlib.h>

int main()

{

for(int a=1,j=1;j<=5;j++)

for(int i=1;i<=5;i++)

{

printf("%d\n", a);

a++;

}

return 0;

}

**Result:**

1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25

**Lab task 6:**

Write a C program using for loop to find the sum of the integers 73 through 415 inclusive.

**Program:**

#include <stdio.h>

#include <stdlib.h>

int main()

{

int sum=0;

for(int j=73;j<=415;j++)

{

sum+=j;

}

printf("Sum = %d", sum);

return 0;

}

**Result:**

Sum = 83692

**Lab task 7:**

Write a program that input one integer n from the user. It prints all the even number from 1 to n.

**Program:**

#include <stdio.h>

#include <stdlib.h>

int main()

{

int n=0;

printf("Enter an integer: ");

scanf("%d", &n);

for(int i=1;i<=n;i++)

{

if(i%2==0)

printf("%d ", i);

}

return 0;

}

**Result:**

Enter an integer: 9

2 4 6 8

**Lab task 8:**

Write a C program to input characters from the user until a blank is read. Use a for loop to find the number of nonblank characters read from the keyboard.

**Program:**

#include <stdio.h>

#include <stdlib.h>

int main()

{

char c; int count = 0;

printf("Enter characters: ");

for (;;)

{

scanf("%c", &c);

if (c==' '){

break;}

count++;

}

printf("\nNumber of non-blank characters entered: %d", count);

return 0;

}

**Result:**

Enter characters: had you been

Number of non-blank characters entered: 3

**Lab task 9:**

Write a program for a matchstick game being played between the computer and a user. Your program should ensure that the computer always wins. Rules for the game are as follows:

− There are 21 matchsticks.

− The computer asks the player to pick 1, 2, 3, or 4 matchsticks. − Whoever is forced to pick up the last matchstick loses the game − After the person picks, the computer does its picking

**Program:**

#include <stdio.h>

#include <stdlib.h>

int main()

{

int matchsticks = 21, user\_pick, computer\_pick;

printf("Welcome to the Matchstick Game!\n");

printf("Rules:\n");

printf("1. There are 21 matchsticks.\n");

printf("2. You can pick 1, 2, 3, or 4 matchsticks.\n");

printf("3. Whoever picks the last matchstick loses.\n");

while (matchsticks > 0)

{

printf("\nMatchsticks left: %d\n", matchsticks);

printf("Your turn! Pick 1, 2, 3, or 4 matchsticks: ");

scanf("%d", &user\_pick);

if (user\_pick < 1 || user\_pick > 4)

{

printf("Invalid choice! Please pick 1, 2, 3, or 4 matchsticks.\n");

continue;

}

matchsticks -= user\_pick;

if (matchsticks == 1)

{

printf("\nOnly one matchstick left! Computer is forced to pick it. Computer loses!\n");

break;

}

computer\_pick = 5 - user\_pick;

matchsticks -= computer\_pick;

printf("Computer picks %d matchstick(s).\n", computer\_pick);

if (matchsticks == 1)

{

printf("\nOnly one matchstick left! You are forced to pick it. You lose!\n");

break;

}

}

return 0;

**Result:**

Welcome to the Matchstick Game!

Rules:

1. There are 21 matchsticks.

2. You can pick 1, 2, 3, or 4 matchsticks.

3. Whoever picks the last matchstick loses.

Matchsticks left: 21

Your turn! Pick 1, 2, 3, or 4 matchsticks: 2

Computer picks 3 matchstick(s).

Matchsticks left: 16

Your turn! Pick 1, 2, 3, or 4 matchsticks: 3

Computer picks 2 matchstick(s).

Matchsticks left: 11

Your turn! Pick 1, 2, 3, or 4 matchsticks: 1

Computer picks 4 matchstick(s).

Matchsticks left: 6

Your turn! Pick 1, 2, 3, or 4 matchsticks: 3

Computer picks 2 matchstick(s).

Only one matchstick left! You are forced to pick it. You lose!

**Conclusion:**

In this lab, we used different loop structures to solve different problems that required repetitive solutions. In which case a condition is checked again and again until it comes true and the loop ends otherwise it goes on until finally the conditions are satisfied.