

Homework #4 – Solution

(C Programming for Beginners - OnLine)

4.1 Here is a listing of a program, use a paper computer and answer how many times each loop is executed

a) How many times this loop is executed?

```
int i = 0;
while (i++ < 10) {
    printf("Hello World: %d\n", i);
}
```

Answer:

10 times

b) How many times this loop is executed if we changed the counter increment to ++i ?

```
i = 0;
while (++i < 10) {
    printf("Hello World: %d\n", i);
}
```

Answer:

9 times

c) How many times this loop is executed, if it is executed immediately after the loop in #b, i.e. i is not reinitialized before the loop?

```
while (++i < 10) {
    printf("Hello World: %d\n", i);
}
```

Answer:

Interestingly, 0 times, as the i is already 10 after the #b) loop

4.2 Remember our famous homework#1 program? This program draws a box 20 characters in width and 10 characters in height, using a '-' for horizontal line and '|' for vertical line.

```
printf("Using brutal force: \n");
```

```

printf("-----\n");
printf("|               |\n");
printf("|               |\n");
printf("|               |\n");
printf("|               |\n");
printf("|               |\n");
printf("|               |\n");
printf("|               |\n");
printf("|               |\n");
printf("-----\n");

```

Only printf() is used for this purpose. A good solution could involve a loop, which now you know. So, write the solution - using loop.

Hint: One way to solve this would be by writing a loop to draw top line and nested loops to draw the middle lines and later similar loop like top for the bottom line.

Answer:

```

int j = 0;
int k = 0;

printf("\nUsing while loop, better solution: \n");
// Draw first line
// "-----"

while (j < 20)
{
    printf("-");
    j++;
}

printf("\n");

while (k < 8)
    //remember, there are only 10-2=8 lines in the middle
{
    //then          |          |
    j = 0;
    printf("|"); //left pipe
    while (j < 18)
        //there are only 20-2 spaces in the center
        {
            printf(" "); //center spaces
            j++;
        }
    printf("| \n"); //write pipe and new line
    k++;
}

```

```

//finally last line
//-----
j = 0;
while (j < 20)
{
    printf("-");
    j++;
}
printf("\n"); //new line

```

4.2 Change the while loop in 4.2 to do..while loop to print the same box.

Answer:

```

int j1 = 0;
int k1 = 0;

printf(
    "\nUsing do .. while loop, better solution: \n");
// Draw first line
//"-----"

do {
    printf("-");
    j1++;
} while (j1 < 20);

printf("\n");

do //remember, there are only 10-2=8 lines in the middle
{
    //then          |          |
    j1 = 0;
    printf("|"); //left pipe

    do //there are only 20-2 spaces in the center
    {
        printf(" "); //center spaces
        j1++;
    } while (j1 < 18);

    printf("|\\n"); //write pipe and new line
    k1++;
} while (k1 < 8);

//finally last line
//-----
j1 = 0;
do
{
    printf("-");

```

```

        j1++;
    } while (j1 < 20);
    printf("\n"); //new line

```

4.4 Change the while loop in 4.3 to *for* - loop to print the same box

Answer:

```

int count1, count2;
int height = 10, width = 20;
printf("\nUsing for-loop: \n");
for (count1 = 1; count1 < width; count1++)
{
    printf("-");
}
printf("\n");
for (count1 = 1; count1 < height; count1++)
{
    printf("|");
    for (count2 = 1; count2 < width - 2; count2++)
        printf(" ");
    printf("| \n");
}
for (count1 = 1; count1 < width; count1++)
{
    printf("-");
}
printf("\n\n");

```

4.5 Modify the program in 4.4 and use variables for horizontal, vertical characters instead of hard coded values like '|', '-'. Ask user for all these values height, width, and characters to draw ('|', '-') instead of using hard coded values.

Answer:

```

int loop1, loop2;
char hChar, vChar;
int ht, wd;
printf("\nUsing for-loop and user values: \n");

printf("\nPlease enter height of a box: ");
scanf("%d", &ht);
printf("\nPlease enter width of a box: ");
scanf("%d", &wd);

//you first need to flush the buffer, which still has
//'\n' character due to pressing enter
while (getchar() != '\n');

printf(

```

```

        "\nPlease enter the vertical charcters to draw box: ");
scanf("%c", &vChar);

//don't forget to remove the newline character after
//reading just a charcter in above code
while (getchar() != '\n');

printf(
    "\nPlease enter the horizontal charcters to draw box: ");
scanf("%c", &hChar);
while (getchar() != '\n');

printf("\n");
for (loop1 = 1; loop1 < wd; loop1++)
{
    printf("%c", hChar);
}

printf("\n");

for (loop1 = 1; loop1 < ht - 2; loop1++)
{
    printf("%c", vChar);
    for (loop2 = 1; loop2 < wd - 2; loop2++)
        printf(" ");
    printf("%c\n", vChar);
}
for (loop1 = 1; loop1 < wd; loop1++)
{
    printf("%c", hChar);
}
printf("\n");

```

4.5 Modify the program in 4.5 so that it repeats the drawing by asking user to continue. If user enters 'y' then continue drawing more boxes.

Answer:

```

int counter1, counter2;
char hChar1, vChar1;
int ht1, wd1;
char answer = 'y';

printf("\nUsing for-loop and user values, continuously: \n");

while (answer == 'y') {
    printf("\nPlease enter height of a box: ");
    scanf("%d", &ht1);
    printf("\nPlease enter width of a box: ");
    scanf("%d", &wd1);
}

```

```

//you first need to flush the buffer, which still has
//'\n' character due to pressing enter
while (getchar() != '\n');

printf(
    "\nPlease enter the vertical charcters to draw box:
");
scanf("%c", &vChar1);

//don't forget to remove the newline character after
//reading just a charcter in above code
while (getchar() != '\n');

printf(
    "\nPlease enter the horizontal charcters to draw box:
");
scanf("%c", &hChar1);

printf("\n");
for (counter1 = 1; counter1 < wd1; counter1++)
{
    printf("%c", hChar1);
}

printf("\n");

for (counter1 = 1; counter1 < ht1 - 2; counter1++)
{
    printf("%c", vChar1);
    for (counter2 = 1; counter2 < wd1 - 2; counter2++)
        printf(" ");
    printf("%c\n", vChar1);
}
for (counter1 = 1; counter1 < wd1; counter1++)
{
    printf("%c", hChar1);
}
printf("\n");

//clean up the newline after last character read
while (getchar() != '\n');

printf("Continue? Type 'y' for yes: ");
scanf("%c", &answer);

    }
printf("\nThank you for using my program\n");
return 0;
}

```