

Sample C-Programs for CHAPTER 3

1. if /else statement

```
#include <stdio.h>
int main ()
{

int grade;

printf("Please enter your grade (as integer value) :\n");
scanf("%d",&grade);

if ( grade >= 60 )
printf("Congrats. You can take the follow up course. \n");
else
printf("Sorry but you need to repeat the class.\n");

return 0;
}
```

2. Ternary operator usage

```
#include <stdio.h>
int main ()
{

int grade;

printf("Please enter your grade (as integer value) :\n");
scanf("%d",&grade);

printf("%s\n", grade >60 ?"Congrats. You can take the follow up course." : "Sorry but you need to
repeat the class.");

return 0;
}
```

3. Multiple selection using nested if/else structures

```
#include <stdio.h>
int main()
{int grade;

printf("Please enter your grade (as integer value) :\n");
scanf("%d",&grade);

if (grade >=90 )
    printf("Your letter grade is A.\n");
else if (grade >=80 )
    printf("Your letter grade is B.\n");
else if (grade >=70 )
    printf("Your letter grade is C.\n");
else if (grade >=60 )
    printf("Your letter grade is D.\n");
else
    printf("Your letter grade is F.\n");
return 0;
}
```

4. Compound Statement, block of code

Incorrect

```
#include <stdio.h>
int main ()
{
int grade;

printf("Please enter your grade as integer :\n");
scanf("%d",&grade);

if ( grade >= 60 )
printf("Congrats. You can take this course. \n");
else
printf("Failed.\n");
printf("You must take this course again.\n");

return 0;
}
```

Correct

```
#include <stdio.h>
int main ()
{
int grade;

printf("Please enter your grade as integer :\n");
scanf("%d",&grade);

if ( grade >= 60 )
printf("Congrats. You can take this course. \n");
else
{
printf("Failed.\n");
printf("You must take this course again.\n");
}

return 0;
}
```

How while loop works?

The while loop evaluates the test expression.

If the test expression is true (nonzero), codes inside the body of while loop is evaluated. The test expression is evaluated again. The process goes on until the test expression is false. When the test expression is false, the while loop is terminated.

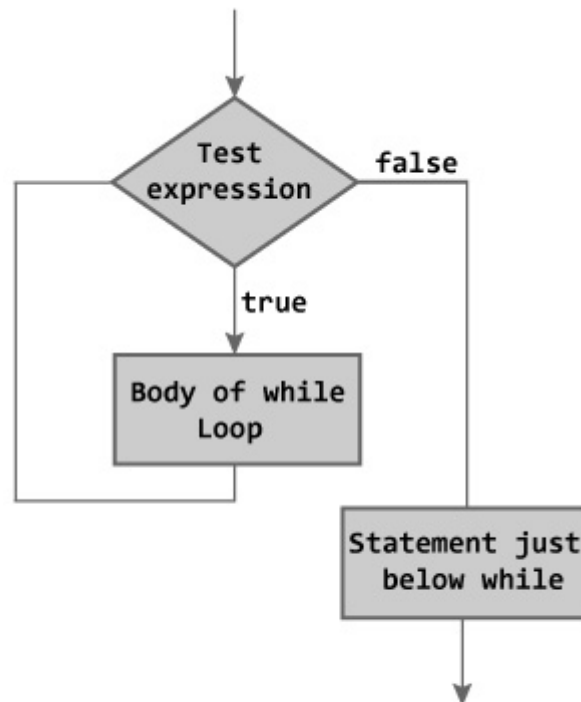


Figure: Flowchart of while Loop

5. counter and while repetition structure

```
#include <stdio.h>
int main ()
{
    int counter = 1;

    while(counter <= 10)
    {
        printf("%d\n",counter);
        counter = counter + 1;
    }

    return 0;
}
```

6. print the value, square of the value and the cube of the value for values 1-10

```
#include <stdio.h>
int main ()
{

int counter = 1;
printf("%s\t%s\t%s\n", "Value", "Square", "Cube");

while(counter <= 10)
{
printf("%d\t%d\t%d\n", counter, counter*counter, counter*counter*counter);
counter = counter + 1;
}

return 0;
}
```

7. Second while loop example

```
#include <stdio.h>
main()
{
int i = 10;

while ( i > 0 )
{
printf("Hello %d\n", i);
i = i -1;
}
}

#include <stdio.h>
main()
{
int i = 10;
while ( i > 0 )
{
printf("Hello %d\n", i);
i = i -1;
if( i == 6 ){
break;
}
}
}
```

9. Find the quiz average for a class of 10 students

```
#include <stdio.h>
int main ()
{

int counter;
int grade, total;
float average;

total = 0;
counter = 1;

while(counter <= 10)
{
printf("Please enter your quiz grade:\n");
scanf("%d",&grade);
total = total + grade;
counter = counter + 1;
}

average = (float) total / (counter-1);

printf("Quiz average is %.2f.\n",average);

return 0;
}
```

10. Four while loop example to calculate factorial

```
// Program to find factorial of a number
// For a positive integer n, factorial =
1*2*3...n

#include <stdio.h>
int main()
{
    int number;
    long factorial;
    printf("Enter an integer:");
    scanf("%d",&number);
    factorial = 1;
    // loop terminates when number is <= 0
    while (number > 0){
        factorial *= number;
        // factorial = factorial*number;
        --number;
    }
    printf("Factorial= %ld", factorial);
    return 0;
}
```

Here accuracy low

```
// Program to find factorial of a number
// For a positive integer n, factorial = 1*2*3...n

#include <stdio.h>
int main()
{
    int number;
    long long factorial;

    printf("Enter an integer: ");
    scanf("%d",&number);

    factorial = 1;

    // loop terminates when number is <= 0
    while (number > 0)
    {
        factorial *= number;
        // factorial = factorial*number;
        --number;
    }

    printf("Factorial= %lld", factorial);

    return 0;
}
```

here accuracy higher

10. Example on do/while loop

How do...while loop works?

The code block (loop body) inside the braces is executed once. Then, the test expression is evaluated. If the test expression is true, the loop body is executed again. This process goes on until the test expression is evaluated to 0 (false). When the test expression is false (nonzero), the **do...while** loop is terminated.

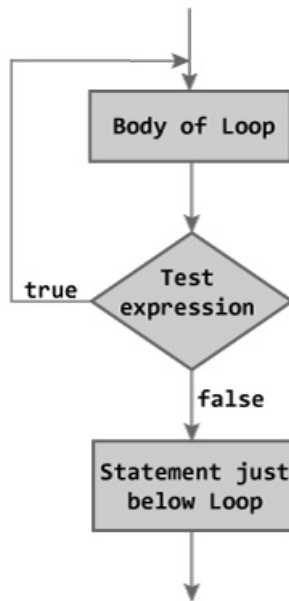


Figure: Flowchart of do...while Loop

```
// Program to add numbers until user enters zero
```

```
#include <stdio.h>
int main()
{
    double number, sum = 0;

    // loop body is executed at least once
    do
    {
        printf("Enter a number: ");
        scanf("%lf", &number);
        sum += number;
    }
    while(number != 0.0);

    printf("Sum = %.2f",sum);

    return 0;
}
```

11. Sentinel (flag) controlled loop

```
/*Class average program with sentinel-controlled repetition */

#include <stdio.h>

int main()
{
    int counter; /* number of grades entered */
    int grade; /* grade value */
    int total; /* sum of grades */

    float average; /* number with decimal point for average */

    /* initialization phase */
    total = 0; /* initialize total */
    counter = 0; /* initialize loop counter */

    printf( "Enter grade, -1 to end: " ); /* prompt for input */
    scanf( "%d", &grade ); /* read grade from user */

    /* loop while sentinel value not yet read from user */
    while ( grade != -1 ) {
        total = total + grade; /* add grade to total */
        counter = counter + 1; /* increment counter */

        /* get next grade from user */
        printf( "Enter grade, -1 to end: " ); /* prompt for input */
        scanf("%d", &grade); /* read next grade */
    } /* end while */

    if ( counter != 0 ) {
        average = ( float ) total / counter;
        printf( "Class average is %.2f\n", average );
    }
    else {
        printf( "No grades were entered\n" );
    }

    return 0;
}
```


12. Sentinel controlled for loop

```
#include <stdio.h>

int main()
{

    int SENTINEL = -9;

    int score,sum =0;

    printf("Enter the first score (%d to quit)> ", SENTINEL);

    for (scanf("%d", &score); score != SENTINEL; scanf("%d", &score)) {
        sum += score;
        printf("Enter next score (%d to quit)> ", SENTINEL);
    }
    printf("Sum = %d \n",sum);
    return 0;
}
```

Output:

```
Enter the first score (-9 to quit)> 2
Enter next score (-9 to quit)> 4
Enter next score (-9 to quit)> 6
Enter next score (-9 to quit)> 8
Enter next score (-9 to quit)> 10
Enter next score (-9 to quit)> 23
Enter next score (-9 to quit)> -9
Sum = 53
```

Process exited after 11.25 seconds with return value 0
Press any key to continue . . .

13. Sentinel controlled loop Example #2

```
#include <stdio.h>

int main()
{

int max, min ;
int number;

max = -999999999;
min = 999999999;

do {
printf("Enter a number (-1 to quit): ");
scanf("%d",&number);

if (number > max)
max = number ;
if (number < min && number != -1)
min = number;

}
while( number != -1 );

printf("Maximum value entered is: %d\n",max);
printf("Minimum value entered is: %d\n",min);
return 0;
}
```

14. Multiple selection structure switch()

The switch statement allows us to select one from multiple options. It is especially useful when we want to write a code that makes a selection based on an expression or a variable. A switch selection structure consists of a series of case labels and an optional default case as shown below.

```
switch(var) {  
    case constant1:  
        statement;  
        ...  
        break;  
    case constant2:  
        statement;  
        ...  
        break;  
    default:  
        statement;  
        ...  
        break;  
}
```

14-1)

```
include <stdio.h>
int main()
{
    int choice ;
    printf("1. Create a new database\n");
    printf("2. Edit a database\n");
    printf("3. Delete a database\n");
    printf("4. Merge databases\n");
    printf("5. Exit System \n");

    printf("Choose what you want to do:\n");
    scanf("%d",&choice);

    switch(choice){
    case 1:
        printf("Creating...\n");
        break;
    case 2:
        printf("Editing...\n");
        break;
    case 3:
        printf("Deleting...\n");
        break;
    case 4:
        printf("Merging...\n");
        break;
    case 5:
        printf("Thank you, Bye.\n");
        break;
    default:
        printf("Invalid Input\n");
        break;
    }

    return 0;
}
```

14-2)

```
#include <stdio.h>
int main()
{
    char choice;
    puts("Meal Plans:");
    puts("A - Breakfast, Lunch, and Dinner");
    puts("B - Lunch and Dinner only");
    puts("C - Dinner only");

    printf("Your choice: ");
    scanf("%c",&choice);
    printf("You've choosen ");
    switch(choice)
    {
        case 'A':
            printf("Breakfast, Lunch, and Dinner ");
            break;
        case 'B':
            printf("Lunch and Dinner only");
            break;
        case 'C':
            printf("Dinner only");
            break;
        default:
            printf("wrongly. Such a meal plan does not exist. \n");
            break;
    }
    return(0);
}
```

14-3)

```
#include <stdio.h>
int main()
{
    int stresp ;
    int i =1;
    int onect=0,twoct=0,threect=0;
    int fourct=0,fivect=0;

    while(i<=5)
    {
        printf("Please rate your lecturer on a scale of 1-5.\n");
        scanf("%d",&stresp);

        switch(stresp){
            case 1:
                onect+=1;
                break;
            case 2:
                twoct+=1;
                break;
            case 3:
                threect+=1;
                break;
            case 4:
                fourct+=1;
                break;
            case 5:
                fivect+=1;
                break;
            default:
                printf("Invalid Input. Try again\n");
                i=i-1;
                break;
        }//end of switch
        i=i+1;

    }//end of while

    printf("The results of the poll was as follows:\n\n");
    printf("There were %d 1s,\n",onect);
    printf("There were %d 2s,\n",twoct);
    printf("There were %d 3s,\n",threect);
    printf("There were %d 4s,\n",fourct);
    printf("There were %d 5s.\n",fivect);

    return 0;
}
```

14-4)

```
#include <stdio.h>

int main()
{
    int c;

    while ((c = getchar()) != EOF)
    {
        putchar(c);
    }

    return(0);
}
```

14-5)

```
#include <stdio.h>
int main()
{
    int grade; /* one grade */
    int aCount = 0; /* number of As */
    int bCount = 0; /* number of Bs */
    int cCount = 0; /* number of Cs */
    int dCount = 0; /* number of Ds */
    int fCount = 0; /* number of Fs */

    printf( "Enter the letter grades.\n" );
    printf( "Enter the EOF character to end input.\n" );

    /* loop until user types end-of-file key sequence */
    while ( ( grade = getchar() ) != EOF ) {
        switch ( grade ) { /* switch nested in while */

            case 'A': /* grade was uppercase A */
            case 'a': /* or lowercase a */
                ++aCount; /* increment aCount */
                break; /* necessary to exit switch */

            case 'B': /* grade was uppercase B */
            case 'b': /* or lowercase b */
                ++bCount; /* increment bCount */
                break; /* exit switch */

            case 'C': /* grade was uppercase C */
            case 'c': /* or lowercase c */
                ++cCount; /* increment cCount */
                break; /* exit switch */

            case 'D': /* grade was uppercase D */
            case 'd': /* or lowercase d */
                ++dCount; /* increment dCount */
                break; /* exit switch */

            case 'F': /* grade was uppercase F */
            case 'f': /* or lowercase f */
                ++fCount; /* increment fCount */
                break; /* exit switch */

            case '\n': /* ignore newlines, */
            case '\t': /* tabs, */
            case ' ': /* and spaces in input */
                break; /* exit switch */
```



```
default: /* catch all other characters */
printf( "Incorrect letter grade entered." );
printf( " Enter a new grade.\n" );
break; /* optional; will exit switch anyway */
} /* end switch */

} /* end while */

/* output summary of results */
printf( "\nTotals for each letter grade are:\n" );
printf( "A: %d\n", aCount ); /* display number of A grades */
printf( "B: %d\n", bCount ); /* display number of B grades */
printf( "C: %d\n", cCount ); /* display number of C grades */
printf( "D: %d\n", dCount ); /* display number of D grades */
printf( "F: %d\n", fCount ); /* display number of F grades */

return 0; /* indicate program ended successfully */

}
```