

Introduction to Programming

Important Dates

► Midterm Test

- 21nd of October 2022 (Friday) - 2-4 pm, IK-201
- 21nd of October 2022 (Friday) - 4-6 pm, IK-201

Switch statement

► switch (expression)

{

case constant1: statements 1;

case constant2: statements 2; **break;**

.....

case constantn-1: statements n-1;

default: statements n;

}



Exercise

- ▶ Write a program which inputs two integer numbers and an operation symbol (+, -, *, /). On the basis of the operation symbol calculate the result.
- ▶ Give an error message if the operation is not what we have listed or in case of the division the denominator is zero.
- ▶ For example: $5 + 2 = 7$, $5 * 2 = 10$, etc.
- ▶ Use the switch statement!
- ▶ `scanf("%d %c %d", &a, &op, &b);`

Solution

```
char op;
int a, b;
printf("Input two integer number and an operation symbol: 5 + 7\n");
scanf("%d %c %d", &a, &op, &b);
    switch (op) {
        case '+': printf("%d + %d = %d\n", a, b, a+b); break;
        case '-': printf("%d - %d = %d\n", a, b, a-b); break;
        case '*': printf("%d * %d = %d\n", a, b, a*b); break;
        case '/':
            if (b == 0)
                { printf("Error: Division by zero!\n"); break; }
            else
                { printf("%d / %d = %.2f\n", a, b, (float)a/b); break; }
        default:
            printf("Default operation symbol!\n");
    }
```

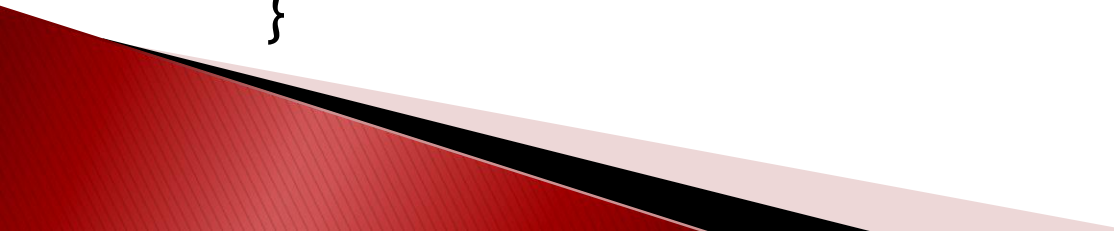
FOR loop

```
for (initialization_expression; loop_condition; increment_expression)
{
    statements;
}
```

i-loop counter

Example:

```
for(i=1; i<=n; i++)
{
    ...
}
```



Exercise

- ▶ Write a program which prints the first 10 integer numbers and their square.

Solution

```
for (i=1; i<=10; i++)  
    printf("%d %d\n", i, i*i);
```


Exercise

- ▶ Write a program which determines the **sum** and **product** of the first **n** number.

Solution

Sum and the product of the first n numbers:

```
int i, n, sum=0, prod=1;  
printf("n="); scanf("%d",&n);  
for (i=1; i<=n; i++)  
    {  
        sum+=i;  
        prod*=i;  
    }  
printf("Sum=%d\nProd=%d\n", sum, prod);
```

Solution

Sum of the first n numbers ($1 + 2 + \dots + n$):

```
int i, n, sum=0;
```

```
for (i=1; i<=n; i++)  
    sum+=i;
```

```
for (i=1, sum=0; i<=n; sum+=i++)
```

Solution

Product of the first n numbers (n!):

```
int i, n, prod=1;
```

```
for (i=1; i<=n; i++)  
    prod*=i;
```

```
for (i=1, prod=1; i<=n; prod*=i++)
```

Exercise

How many lines are displayed/printed out?

```
int i;  
for (i = 0; i < 5; i += 2)  
    printf("Hello World!\n");
```

Exercise

What will be the value of the *j* variable after the execution of the following code.

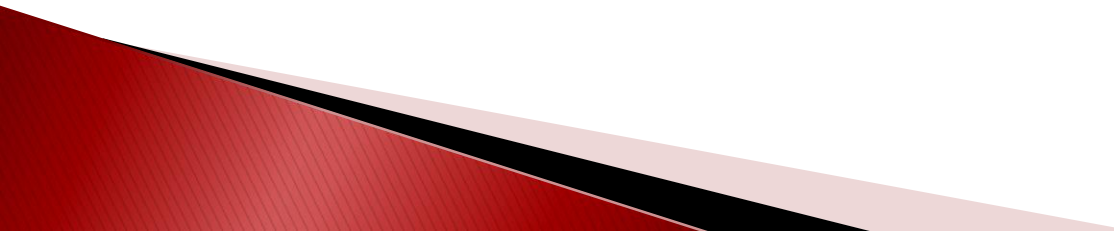
```
int i, k=0, j=0;  
for (i=1; i<=4; i++)  
    j=k++;  
printf ("%d\n",j);
```

Exercise

```
for (i=1; i<=20; i++)  
    printf("%d\n",i);
```

```
for (i=100; i>0; i--)  
    printf("%d\n",i);
```

```
for (i=0; i<1000; i+=5)  
    printf("%d\n",i);
```



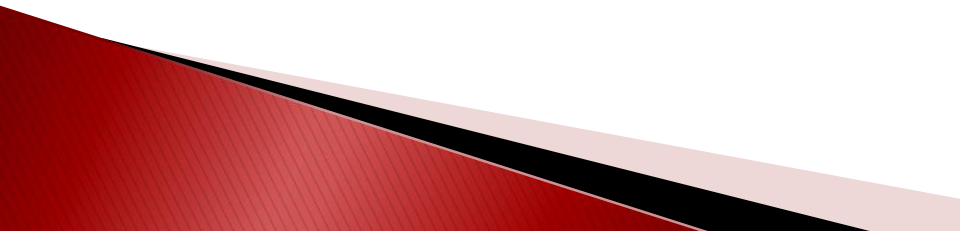
Exercise

```
for (i=1; i<=n; i++)  
    printf("%d %d\n", i, i*i);
```

```
for (i=1; i<=n; i+=2)  
    printf("%d %d\n", i, i*i);
```

```
for (i=n; i>=1; i--)  
    printf("%d %d\n", i, i*i);
```

```
for (i=n; i>=1; i-=5)  
    printf("%d %d\n", i, i*i);
```



Exercise

What is the result after the execution?

```
for (i=1; i<=10; i++)  
    printf("%d\n", i);
```

```
i=1;  
for( ; i<=10; i++)  
    printf("%d\n", i);
```

Exercise

```
i = 1;  
for ( ; ; i++)  
{  
    printf("%d\n", i);  
    if (i == 10) break;  
}
```

```
i = 1;  
for( ; ; )  
{  
    printf("%d\n", i);  
    if (i == 10) break;  
    i = i + 1;  
}
```

Exercise

What is the result of this code?

```
int i;  
for (i=10; i>0; i--)  
    printf("%d ",i);
```

Exercise

What is the result of this code?

```
int i;  
for (i=10; i>0; i=i-2)  
    printf("%d ",i);
```

Exercise

What is the result of this code?

```
int i;  
for (i=10; i>0; i--);  
printf("%d ",i);
```

Exercise

What is the result of this code?

```
int i;  
for (i=1; i!=10; i++)  
    printf ("%d\n",i);
```

Exercise

What is the result of this code?

```
int i=5;  
for ( ; i!=10; i++)  
    printf ("%d\n",i);
```

Exercise

What is the result of this code?

```
int a;  
for (scanf("%d", &a); a != 0; scanf("%d", &a))  
    printf("%d %d\n", a, a*a);
```

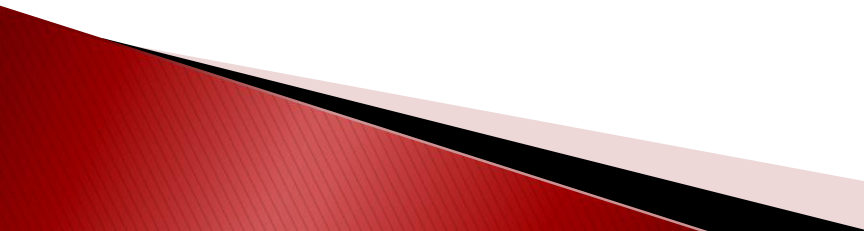

WHILE loop

```
while (condition)
{
    statements;
}
```

Example

Sum of the first n numbers:

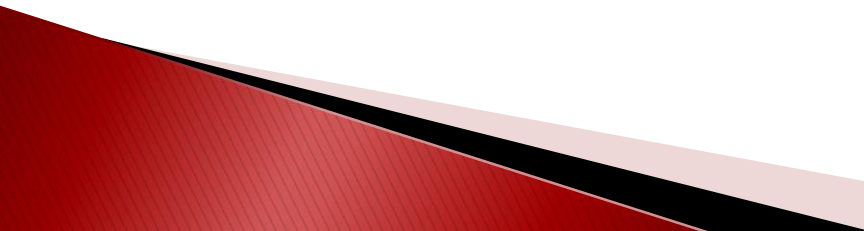
```
int i=1, sum=0;  
while (i<=n)  
{  
    sum+=i;  
    i++;  
    /*sum+=i++;*/  
}
```



Example

Product of the first n numbers:

```
int i=1, prod=1;  
while (i<=n)  
{  
    prod*=i;  
    i++;  
    /*prod+=i++;*/  
}
```



Exercise

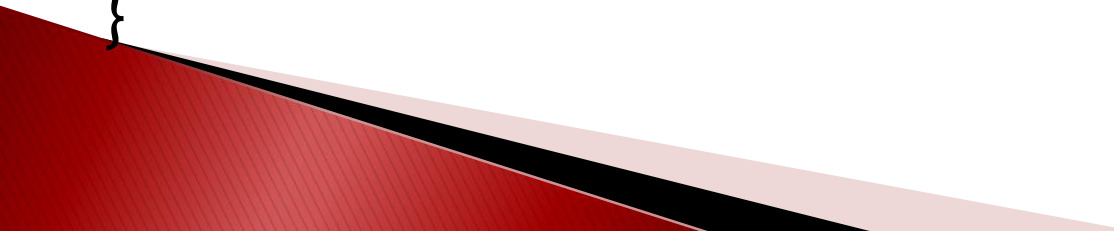
How many lines are printed out in case of 0, 4 and 5?

```
int i;  
scanf("%d", &i);  
while (i < 5) {  
    printf("Hello World!\n");  
    i += 1;  
}
```

Exercise

What is the result of this code?

```
int n;  
printf("n=");  
scanf("%d", &n);  
  
while(n != 0)  
{  
    printf("%d\n", n*n);  
  
    printf("n=");  
    scanf("%d", &n);  
}
```

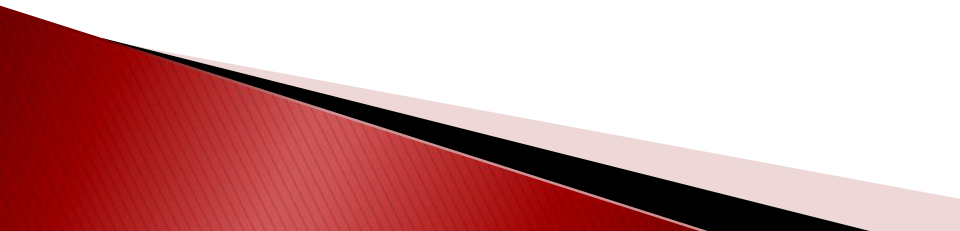


Exercise

Write a program which inputs integer numbers from the keyboard until we type zero, and it determines the average of the input numbers.

Solution

```
int count=0, sum=0, n;  
printf("n=");  
scanf("%d", &n);  
while(n!=0){  
    sum += n;  
    count++;  
    printf("n=");  
    scanf("%d", &n);  
}  
printf("Average=%.2f\n", (float)sum/count);
```

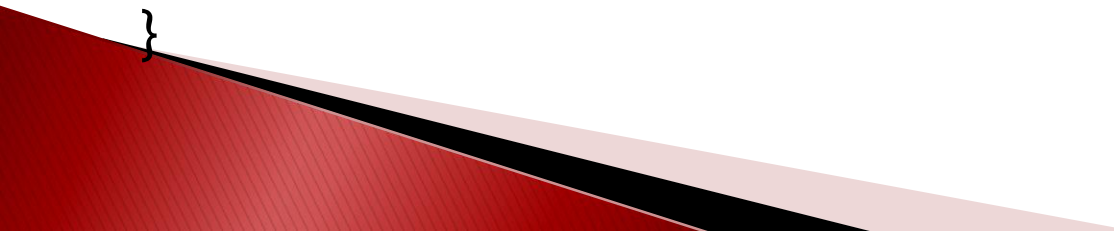


Exercise

Write a program which inputs integer numbers from the keyboard until we type zero, and meanwhile it determines if the input number is even or odd.

Solution

```
int n;  
printf("n=");  
scanf("%d",&n);  
while (n)    //while (n!=0)  
{  
    if (n%2==0)  
        printf("%d even!\n", n);  
    else  
        printf("%d odd!\n", n);  
    printf("n=");  
    scanf("%d",&n);  
}
```



Exercise

Write a program which inputs integer numbers from the keyboard until we type zero, and find the minimum and the maximum.

Solution

```
int n, min, max;
printf("n=");
scanf("%d",&n);
min=n;
max=n;
while(n!=0)
{
    if (n<min)
        min=n;
    if (n>max)
        max=n;
    printf("n=");
    scanf("%d",&n);
}
printf("Minimum: %d\nMaximum: %d\n", min, max);
```

Exercise

What is the result of this code?

```
int i=18;  
while (!i)  
    i--;  
printf("%d\n",i);
```

Exercise

What is the result of this code?

```
int i=7;  
while (i==8)  
    i++;  
printf("%d\n",i);
```

Exercise

What is the result of this code?

```
int i=7;  
while (i=8)  
    i++;  
printf("%d\n",i);
```

Exercise

What is the result of this code?

```
int i=7;  
while (i=0)  
    i++;  
printf("%d\n",i);
```

Which are infinite?

1. `i = 1; while(!i) {...}`
2. `for (x = 1;; x++) {...}`
3. `i = 0; while(!i) {...}`
4. `int i=5; while(i == 10) i=10;`
5. `for(x = 10; x >= 10; x++) {...}`