

Function

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Program example: X^3

```
Program calculator(input, output);  
Var x,y : integer;  
Begin  
  write('Please input a number');  
  Readln(x);  
  y := x * x * x;  
  writeln('The answer is', y)  
End.
```

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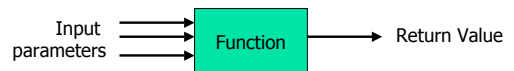
Subroutine Calls

- Easy program by solving small problems
- 2 forms of subroutines:
 - Procedure (user-defined statements)
 - Function (user-defined operators)
- Must be defined in Declaration part

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Function

- To define an operation
- Only one return output



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Two classes of function

- Standard functions
 - Predefined
 - Examples: Abs(x), sqr(x), sqrt(x), sin(x)
- User-defined function
 - Defined by us
 - Defined in the declaration part of the program
 - Examples: power3(x), max(x)

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Function

```
Function func_name (parameter): Return Type;  
Declaration part  
Begin  
  Operation  
  ...  
  func_name := Return_value;  
End;
```

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Function Example: X^3

```
Function power3(num:integer):integer;  
Begin  
    power3 := num * num * num;  
End;
```

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To use a Function

Need to know:

- Function name
- Number of parameters required
- Type of each parameter
- Type of the returned value

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Function in a program: X^3

```
Program calculator;  
Var x,y : integer;  
Function power3(num:integer):integer;  
Begin  
    power3 := num * num * num;  
End;  
Begin {main routine}  
    write("Please input a number");  
    Readln(x);  
    y := power3(x);  
    writeln("The answer is", y)  
End.
```

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Example: max function

```
Function max(x,y : integer): integer;  
Begin  
    if x > y then  
        max := x  
    else  
        max := y  
End;
```

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Example: min function

```
Function min(x,y: real): real;  
Begin  
    if x < y then  
        min := x  
    else  
        min := y  
End;
```

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Example: US_to_Baht function

```
Function US_to_Baht(dollar:real):real;  
Begin  
    US_to_Baht := dollar * 41;  
End;
```

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Example: circle_area function

```
Function circle_area(rad:real) :real;  
Const Pi_value = 3.14  
Begin  
    circle_area := Pi_value * sqr(rad);  
End;
```

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Example: circle_volume function

```
Function power3(num:integer):integer;  
Begin  
    power3 := num * num * num;  
End;  
Function circle_volume(rad:real) :real;  
Const Pi_value = 3.14  
Begin  
    circle_volume :=  
        4/3 * Pi_value * power3(rad);  
End;
```

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Function VS Procedure

Function	Procedure
Compute a single value	Perform a separate subtask
For a new specialized operator	For a new specialized statement
Single variable parameter	> 1 variable parameter

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Well-design program

```
Program calculator;  
Var x: integer;  
Procedure read_data (var n:integer);  
Begin  
    write('Please input a number');  
    Readln(n);  
End;  
Function power3(num:integer):integer;  
Begin  
    power3 := num * num * num;  
End;  
Begin {main routine}  
    read_data (x);  
    writeln('The answer is', power3(x))  
End.
```

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