



Macro Programming

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Macro Programming

User Defined Functions (UDFs) & Return Values

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User Defined Function (UDF)

- A **UDF** is a custom function written in VBA.
- It can be used in Excel formulas like `=SUM()` or `=AVERAGE()`.
- UDFs always **return a value**, unlike macros which perform actions.



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User Defined Function (UDF)

Function SquareNumber(x As Double) As Double

SquareNumber = x * x

End Function

Usage in Excel:

=SquareNumber(A1)



Difference Between Macros and UDFs

Aspect	Macros (Sub Procedures)	UDFs (Function Procedures)
Purpose	Automate actions (formatting, copying, etc.)	Perform calculations and return a result
Called From	Buttons, menus, or VBA code	Worksheet formulas or VBA
Return Value	None (Sub doesn't return a value)	Must return a value
Example	Sub FormatReport()	Function GetDiscount()



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Creating a Simple UDF

```
Function AddTwoNumbers(a As Double, b As Double) As Double
```

```
    AddTwoNumbers = a + b
```

```
End Function
```



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Creating a Simple UDF

Steps:

1. Open **VBE (Alt + F11)**.
2. Insert → **Module**.
3. Type the code above.

Go back to Excel and type:

```
=AddTwoNumbers(10, 20)
```



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Creating a Simple UDF

Explanation:

Functions can take multiple parameters and return one value.



Working with Ranges

You can use ranges as inputs:

```
Function RangeSum(rng As Range) As Double  
    RangeSum = Application.WorksheetFunction.Sum(rng)  
End Function
```

- The argument type **Range** allows users to pass entire cell ranges from worksheets.



Returning Arrays from UDFs

You can return arrays, but must **enter the formula as an array formula** in Excel.

```
Function MultiplesOf(n As Integer) As Variant
    Dim arr(1 To 5) As Integer, i As Integer
    For i = 1 To 5
        arr(i) = n * i
    Next i
    MultiplesOf = Application.Transpose(arr)
End Function
```



Returning Arrays from UDFs

Steps:

1. Enter `=MultiplesOf(3)` in Excel.
2. Press **Ctrl+Shift+Enter** to return `{3;6;9;12;15}`.



Handling Errors in UDFs

Function SafeDivide(num As Double, denom As Double) As Variant

On Error GoTo ErrHandler

If denom = 0 Then

 SafeDivide = "Error: Divide by zero"

Else

 SafeDivide = num / denom

End If

Exit Function

ErrorHandler:

 SafeDivide = CVErr(xlErrValue)

End Function



Limitations of UDFs

UDFs **cannot**:

- Change cell formatting.
- Insert/delete rows or columns.
- Display message boxes.
- Modify other cells.

They are **purely for returning values** to the calling cell.



Experiential Task : Calculator

Task:

1. Create a UDF Bonus(sales, target, rate)

2. If sales >= target, return sales * rate; else return 0.

Example:

=Bonus(B2, 1000, 0.1)



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