

Atan2.bas

companion program to the article

[UNDERSTANDING AND PLOTTING POLAR COORDINATES](#) by *Tom Nally*

Editor's note:

This function works fine, just be aware that it returns angle in range $0..2\pi$
(and atan2 from C standard library returns angle in range $-\pi..\pi$)

```
! *****
!
'Atan2.bas by Nally + April 2000
'Released as open source
,
'A function called ATAN2() is provided herein.
'ATAN2() takes two arguments: cartesian x and y
'coordinates. It returns an angle, phi, in radians.
,
'ATAN2() differs from ATN() in this regard:
'while ATN() only returns an angle between
'-pi/2 and +pi/2, ATAN2() will return any
'angle in the full circle.
,
'The user should not call the function if both
'x and y = 0. This corresponds to a point at
'the origin of the coordinate system where
'the angle phi has no meaning.
,
! *****

    pi = 3.14159265
    Print " "
    Print "Note: Input real numbers for"
    Print " x and y. Either x or y"
    Print " or both must be non-zero."
    Print " "
    Print "*** INPUT ***"
    Print " "
Input "x = "; x
    Input "y = "; y
Print " "
    Print "*** OUTPUT ***"
    Print " "
phiRads = ATAN2(x, y)
```

```
    phiDegs = 360 * (phiRads / (2 * pi))
    R = (x^2 + y^2)^(1/2)
    Print "Cartesion Coordinates of Q....Q("; x; ", "; y;      ")"
    Print " "
    Print "ATAN2 in radians....."; phiRads
    Print "ATAN2 in degrees....."; phiDegs
    Print "Distance to Q....."; R
    Print " "
    Print
    "Polar Coordinates of Q.....Q("; phiRads; ", ";      R;")"

    End
Function ATAN2(x, y)
    pi = 3.14159265
    Result$ = "Undetermined"
    If (x = 0) and (y > 0) Then
        ATAN2 = pi / 2
        Result$ = "Determined"
    End If
    If (x = 0) and (y < 0) Then
        ATAN2 = 3 * pi / 2
        Result$ = "Determined"
    End If
    If (x > 0) and (y = 0) Then
        ATAN2 = 0
        Result$ = "Determined"
    End If
    If (x < 0) and (y = 0) Then
        ATAN2 = pi
        Result$ = "Determined"
    End If
    If Result$ = "Determined" Then [End.of.function]
        BaseAngle = Atn(abs(y)/abs(x))
        If (x > 0) and (y > 0) Then ATAN2 = BaseAngle
        If (x < 0) and (y > 0) Then ATAN2 = pi - BaseAngle
        If (x < 0) and (y < 0) Then ATAN2 = pi + BaseAngle
        If (x > 0) and (y < 0) Then ATAN2 = 2*pi - BaseAngle
    [End.of.function]
End Function
```