

Math Functions

Basic Math Functions

Both program and logic banks allow for the following mathematical operations:

Operation	Format	Description
=	P1.1=P2.1+V1.1	Equals. Sets P1.1 to the result of the following operation
+	P1.1=P2.1+V1.1	Addition. Sets P1.1 to the sum of P2.1 and V1.1
-	P1.1=P2.1-V1.1	Subtraction. Sets P1.1 to the difference of P2.1 and V1.1
*	P1.1=P2.1*V1.1	Multiplication. Sets P1.1 to the product of P2.1 and V1.1
/	P1.1=P2.1/V1.1	Division. Sets P1.1 to the quotient of P2.1 and V1.1

Advanced Math Functions

In addition to the above basic math functions, there are some advanced math functions available as well:

U1	Sine
<p>This function will calculate the sine of the operand.</p> $U1(x) = \sin(x * 2\pi)$ <p>The functions is scaled such that:</p> $U1(x) = 10000\sin((x \div 10000) 2\pi)$	
B1 X0 S1.1=U1(V1.1) V1.1=V1.1+1 X- END	This bank will set speed S1 to the sine of V1. V1 is then incremented. The bank is then looped indefinitely.
U2	Cosine

This function will calculate the cosine of the operand.

$$U2(x) = \cos(x \cdot 2\pi)$$

The functions is scaled such that:

$$U2(x) = 10000 \cos((x \div 10000) 2\pi)$$

B1

X0

S1.1=U2(V1.1)

V1.1=V1.1+1

X-

END

This bank will set speed S1 to the cosine of V1. V1 is then incremented. The bank is then looped indefinitely.

U3

Square Root

This function will calculate the square root of the operand.

$$U3(x) = \sqrt{x}$$

The value returned by this function is an integer value. For example 7=2. For higher accuracy it is suggested to scale the solution by orders of 10.

P1.1=P2.1+U3
(V1.1)

Position one is equal to position two plus the square root of variable one.

U5

Polynomial Using N

Performs a polynomial calculation on the desired operand using the N register as the polynomial coefficients.

N0 is the polynomial order, to a maximum of 25

N1-N25 are the polynomial coefficients

N0=n

$$U5(x) = (N1)x^0 + (N2)x^1 + (N3)x^2 \dots + (Nn)x^{(n-1)}$$

N0=4

V1.1=U5(P2.1)

V1.1=(N1)+(N2)(P2.1)+(N3)(P2.1)² +(N4)(P2.1)³

U6

Polynomial Using R

Performs a polynomial calculation on the desired operand using the R register as the polynomial coefficients.

R0 is the polynomial order, to a maximum of 25

R1-R25 are the polynomial coefficients

R0=n

$$U6(x)=(R1)x^0+(R2)x^1+(R3)x^2...+(Rn)x^{(n-1)}$$

N0=4

$$V1.1=(R1)+(R2)(P2.1)+(R3)(P2.1)^2+(R4)(P2.1)^3$$

V1.1=U5(P2.1)