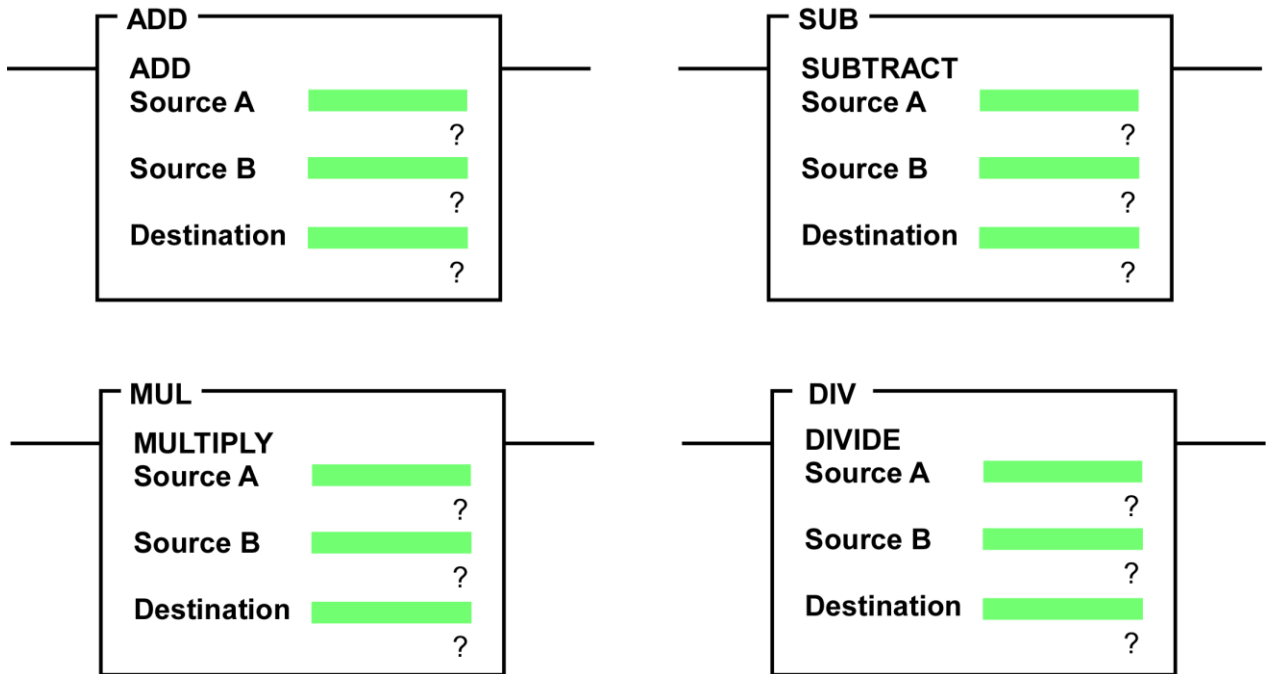


EET165 Lecture #10

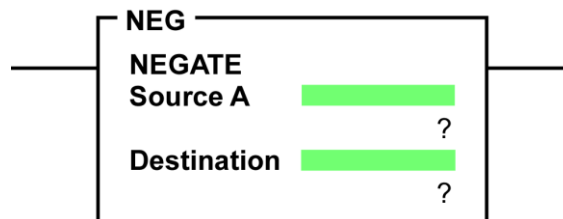
- 1) **Review:** Answer any questions from last week.
- 2) **Basic Math Functions:** There are four basic math functions that work just like you expect them to work. Source A and Source B have a math function performed on them and the solution is stored in the destination.



The source: The source can be an input (I:1/x), a memory location (such as N7:2 or F8:12), an instruction field (T4:1.ACC), or a constant (such as 5 or 12.3).

The destination: The destination can be an output (O:2/x), a memory location (such as N7:2 or F8:12), or an instruction field (T4:1.ACC).

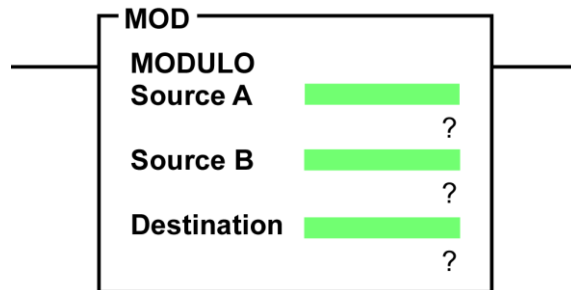
- 3) **NEG** - Some of the other functions are just as obvious as the previous commands. NEG that will flip the sign of the value. It will make a positive value negative or a negative value positive.



- 4) **CLR** – CLR will set a value to zero.



- 5) **MOD** – MOD will return only the remainder of a divide.



For example:

$7 / 3 = 2$ Remainder 1, so the answer is 1.

$17 / 5 = 3$ Remainder 2, so the answer is 2.

$23 / 6 = 3$ Remainder 5, so the answer is 5.

If you take the mod of a number, such as 6, there are 6 possible values, they are 0 through 5.

If you take the mod of a number, such as 9, there are 9 possible values, they are 0 through 8.

If you take the mod of a number, such as 10, there are 10 possible values, they are 0 through 9.

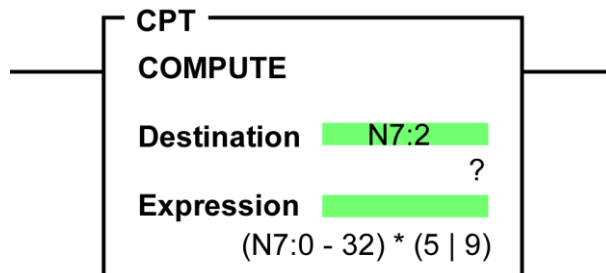
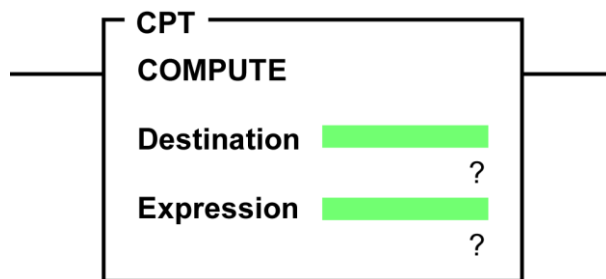
If you take the mod of a number, such as 33, there are 33 possible values, they are 0 through 32.

6) **CPT**: CPT is a compute command that lets you enter an equation that will be calculated for you and stored in the destination. You can use the following symbols in your equation:

- a. + for addition
- b. - for subtraction
- c. * for multiplication
- d. | or (DIV) for division
- e. ** (or XPY) to raise a value to a power (ie: 2 **3 is 2 to the 3rd power)

You can also use the following functions:

- a. SQR for square root
- b. ABS for absolute value
- c. The following trig functions - SIN, ASN, COS, ACS, TAN, and ATN
- d. DEG and RAD to convert between degrees and radians
- e. LOG and LN for the LOG and Natural Log
- f. And the following logical comparisons - NOT, XOR, OR, AND



- 7) **Variables:** Variables are used to hold values that are used in equations as well as control equipment. We have already covered both types of variables that you can use with the PLC, the integer, and the float.
- a. **Integer:** An integer does not have a decimal point; it is a whole number only. The integers are stored in file N7 and each integer is given value to keep them separated. For example, N7:0, N7:1, N7:2, and so on.
 - b. **Float:** Float stands for floating point value, it is a whole number and a fractional part. The floats are stored in file F8 and each float is given value to keep them separated. For example, F8:0, F8:1, F8:2, and so on.
- 8) **Floats into Integers:** When math equations are calculated, the PLC keeps track of the fractional part of the number. If the value is stored in a Float (F8) the fractional part is saved. If the value is stored in an integer (N7) the value is rounded following these rules:
- a) **Rule 1:** If the fractional value is greater than or equal to .5, the integer is rounded up to the next whole value.
 - b) **Rule 2:** If the fractional value is less than .5, the integer is rounded down to the next whole value.