map()

[Math]

Description

Re-maps a number from one range to another. That is, a value of **fromLow** would get mapped to **toLow**, a value of **fromHigh** to **toHigh**, values in-between to values in-between, etc.

Does not constrain values to within the range, because out-of-range values are sometimes intended and useful. The constrain() function may be used either before or after this function, if limits to the ranges are desired.

Note that the "lower bounds" of either range may be larger or smaller than the "upper bounds" so the map() function may be used to reverse a range of numbers, for example

y = map(x, 1, 50, 50, 1);

The function also handles negative numbers well, so that this example

y = map(x, 1, 50, 50, -100);

is also valid and works well.

The map() function uses integer math so will not generate fractions, when the math might indicate that it should do so. Fractional remainders are truncated, and are not rounded or averaged.

Syntax

map(value, fromLow, fromHigh, toLow, toHigh)

Parameters

value: the number to map.  
fromLow: the lower bound of the value’s current range.  
fromHigh: the upper bound of the value’s current range.  
toLow: the lower bound of the value’s target range.  
toHigh: the upper bound of the value’s target range.

Returns

The mapped value.

Example Code

/\* Map an analog value to 8 bits (0 to 255) \*/

void setup() {}

void loop() {

int val = analogRead(0);

val = map(val, 0, 1023, 0, 255);

analogWrite(9, val);

}

Appendix

For the mathematically inclined, here’s the whole function

long map(long x, long in\_min, long in\_max, long out\_min, long out\_max) {

return (x - in\_min) \* (out\_max - out\_min) / (in\_max - in\_min) + out\_min;

}

Notes & Warnings

As previously mentioned, the map() function uses integer math. So fractions might get suppressed due to this. For example, fractions like 3/2, 4/3, 5/4 will all be returned as 1 from the map() function, despite their different actual values. So if your project requires precise calculations (e.g. voltage accurate to 3 decimal places), please consider avoiding map() and implementing the calculations manually in your code yourself.