Active High versus Active Low
EEC 180A

Recall the first day of class when we discussed how boolean variables can be defined arbitrarily in the sense of being inverted or not inverted. For example, if Z represents how much water is in a tank, we have two options:

1) $Z = 0$ when the tank is less than half full, and $Z = 1$ when the tank is over half full. It is perhaps more natural to think of Z representing the "fullness" of the tank in this case.
2) $Z = 0$ when the tank is over half full, and $Z = 1$ when the tank is less than half full. It is perhaps more natural to think of Z representing the "emptiness" of the tank in this case.

This concept applies to all boolean signals including combinational block inputs and combinational block outputs.

In some cases, the function of a unit is tied to the value of a signal, and one state is more "active" than the other state. For example, a microwave oven's power switch or a light bulb power wire have states we can think of as being "active."

Using this idea, we will often define signals as either *Active High* or *Active Low* using the following definitions:

	Active High	Active Low
Unit not "active"	$Z = 0$	$Z = 1$
Unit "active"	$Z = 1$	$Z = 0$

Another reason this is an important concept for us in 180A is because (for various detailed circuit reasons beyond the scope of 180A) many chips have active low inputs and outputs. In addition, the LEDs we use for displays in lab have active low inputs.