1. A three-way switch has three inputs $a$, $b$, and $c$, and one output $x$. When any input changes, the output changes. A three-way switch can be used to control a light from three different locations. Use an ordinary two-way switch for each input, and an LED for the output.

You could write a value (truth) table with 4 columns (one for each input and one for the output), and 8 rows (one for each combination of inputs). Then write a binary expression. Then simplify the binary expression. There are several possible resulting expressions; one of them is

$$x = ((a\oplus b)\oplus c)$$

2. A security switch has two inputs $a$ and $b$, and one output $x$. The output changes when both inputs have changed. More precisely, the output changes when both inputs differ from what they were the previous time the output changed. The idea is that person A might flip their input $a$ indicating a desire for the output to change, but the output does not change until person B flips their input $b$ indicating agreement that the output should change. If person A changes $a$ back (gets cold feet) before person B changes $b$, the output does not change. Or person B could go first. Or they could both go at the same time. A safety deposit box can work this way. Sending a nuclear weapon can work this way. Use a switch for each input, and an LED for the output.

You could write a value (truth) table with four columns and eight rows. The columns are $a$, $b$, $\neg x$, and $x$, where $\neg x$ is the old value of $x$. Then write a binary expression, and simplify it. There are several possible resulting expressions; one of them is

$$x = (((a\oplus \neg x) \land (b\oplus \neg x)) \oplus \neg x)$$

The delay can be implemented by an even number (possibly zero) of NOT gates.