Truth table

h	c	p	$(h \land \neg c) \lor (p \land \neg c)$
T	T	T	F
T	T	F	F
T	F	T	T
T	F	F	T
F	T	T	F
F	T	F	F
F	F	T	T
F	F	F	F

Here is a truth table demonstrating our real world example!

f = hc' + pc'

When the the door (c) is unlocked AND the button (p) OR the sensor (c) is activated, the door opens shown by True.

Therefore we demonstrate the logic as

truth table	$(h \land \neg c) \lor (p \land \neg c)$

The door must NOT be locked while one of the sensors are activated

```
f:(h and not c) or (p and not c);
f, h=true, c=true ,p=true;
f, h=true, c=true ,p=false;
f, h=true, c=false ,p=true;
f, h=true, c=false ,p=false;
f, h=false, c=true ,p=true;
f, h=false, c=true ,p=false;
f, h=false, c=false ,p=true;
f, h=false, c=false ,p=false;
```

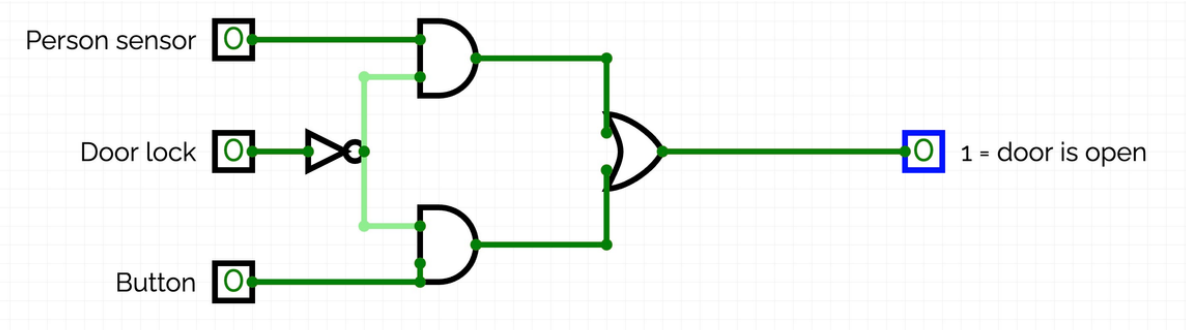
Clic Clear

Putting this into Maxima, a similar logic is shown

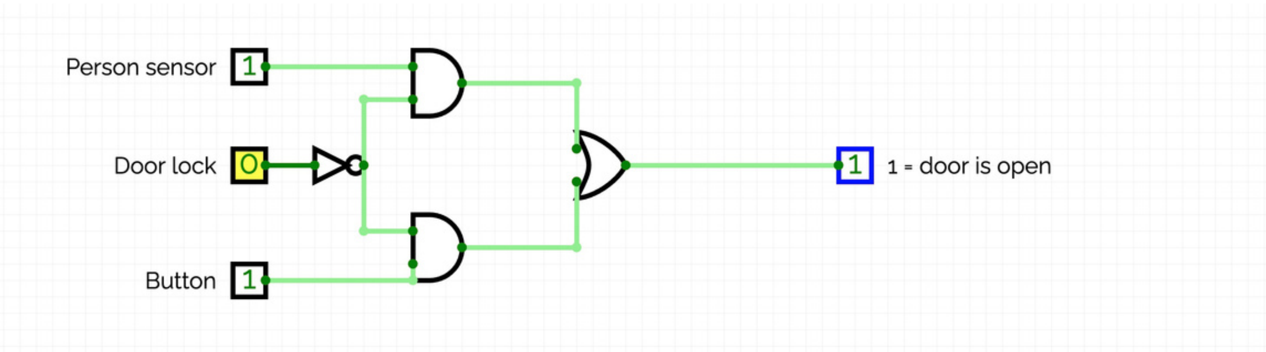
there are a total of 8 combinations with 3 situations where the door is opened

```
(%i1) f:(h and not c) or (p and not
(%o1) h ∧ ¬c ∨ p ∧ ¬c

(%i2) f, h=true, c=true ,p=true;
(%o2) false

(%i3) f, h=true, c=true ,p=false;
(%o3) false

(%i4) f, h=true, c=false ,p=true;
(%o4) true

(%i5) f, h=true, c=false ,p=false;
(%o5) true

(%i6) f, h=false, c=true ,p=true;
(%o6) false

(%i7) f, h=false, c=true ,p=false;
(%o7) false

(%i8) f, h=false, c=false ,p=true;
(%o8) true

(%i9) f, h=false, c=false ,p=false;
```

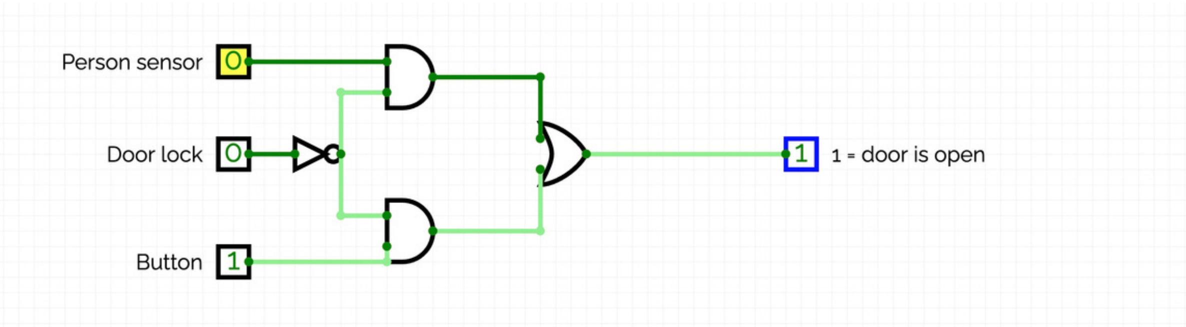
the circuit



Here is the circuit representing the truth tables above. In this case all the components are pointed to 0 which means False.



Here both sensors are being activated while the door is unlocked, therefore the door is opened. Because there is an OR gate it wouldn't matter if only one of the sensors were being used like this...



Again as long as the door is unlocked and one of the sensors are true the door is opened. I attached a video as well going through all the combos!