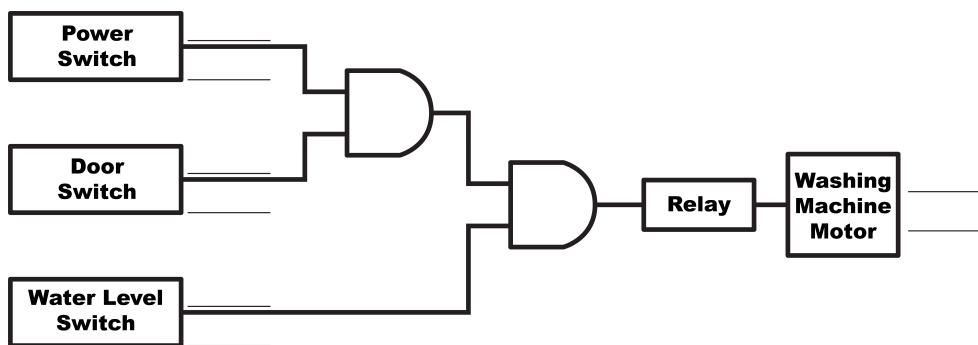


Name:  
 Teacher:  
 Class:  
 Date:

### Logic Gate Applications - Practice Problems Set 4:

1. An electronics company has designed the following control system for an automatic washing machine. The design includes 3 different switches: a Power Switch that can be turned **ON (1)** or **OFF (0)**, a Door Switch that can be **CLOSED (1)** or **OPEN (0)**, and a Water Level Switch that can indicate that the tank is **FULL (1)** or **EMPTY (0)**.



- a) Label the diagram with the logical states at each point in the circuit.
- b) What logic gates are used to create the microcontroller in this circuit?

- c) Complete the truth table for this circuit.

Power	Door	Water Level	Machine Motor
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

d) Under what conditions will stop the washing machine from working?

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2. The company wants to design a second control circuit for their automatic washing machine. This second circuit will be used to control a built in heater. The company's concept is to have two different settings that the operator can select from. First setting would allow the heater to be used to heat the water in the washing machine during a wash cycle if the operator is planing to wash whites or linens. The second setting would allow the operator to set the machine to dry or warm cloths without having to washing them.

The new circuit would use the following switches: Power Switch, Door Switch, Water Level Switch, and a new switch named Heater.

The heater will turn **ON** if the washing machine door is **CLOSED**, there is water in the tank, and the heater switch is turned **ON**, **OR** if the door is **CLOSED** and the heater switch is turned **ON**.

Draw the circuit here:

