

2.55 Consider the museum security alarm function of Exercise 2.53, but for a museum with 10 rooms. A truth table is not a good starting point (too many rows), nor is an equation describing when the alarm should sound (too many terms). However, the inverse of the alarm function can be straightforwardly captured as an equation. Design the circuit for the 10 room security system, by designing the inverse of the function, and then just adding an inverter before the circuit's output.

**Step 1 - Capture the function**

*Skipped - we'll use an equation directly.*

**Step 2 - Convert to equations**

$$\begin{aligned}
 A' = & m_9 m_8 m_7 m_6 m_5 m_4 m_3 m_2 m_1 m_0' + \\
 & m_9' m_8 m_7 m_6 m_5 m_4 m_3 m_2 m_1 m_0' + m_9' m_8' m_7 m_6 m_5 m_4 m_3 m_2 m_1' + \\
 & m_9' m_8' m_7 m_6 m_5 m_4 m_3 m_2 m_1 m_0' + m_9' m_8' m_7 m_6 m_5 m_4 m_3 m_2' m_1 m_0' + \\
 & m_9' m_8' m_7 m_6 m_5 m_4 m_3 m_2 m_1 m_0' + m_9' m_8' m_7 m_6 m_5 m_4 m_3 m_2 m_1' m_0' + \\
 & m_9' m_8' m_7 m_6 m_5 m_4 m_3 m_2 m_1 m_0' + m_9' m_8' m_7 m_6 m_5 m_4 m_3 m_2 m_1 m_0' + \\
 & m_9' m_8' m_7 m_6 m_5 m_4 m_3 m_2 m_1 m_0'
 \end{aligned}$$

**Step 3 - Implement as a gate-based circuit**

