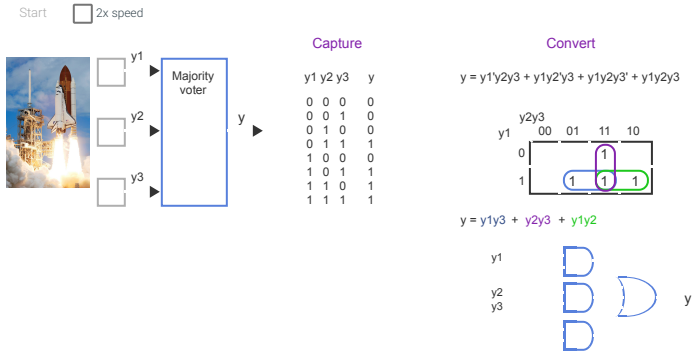
12.4 K-map examples

Example: Majority voter circuit

An earlier section captured a majority voter circuit's behavior as a truth table. The resulting equation can be simplified using a 3-variable K-map before creating a circuit, yielding a smaller circuit than for the original unsimplified equation.

PARTICIPATION ACTIVITY 12.4.1: Majority voter circuit, simplified using a K-map.



PARTICIPATION ACTIVITY 12.4.2: Majority voter circuit simplified using a K-map.

Consider the example above. Type numbers as 2, not two.

1) The K-map had ____ 1's.

Check Show answer

2) The designer drew ____ circles.

Check Show answer

3) ____ circles included the cell for y1y2y3.

Check Show answer

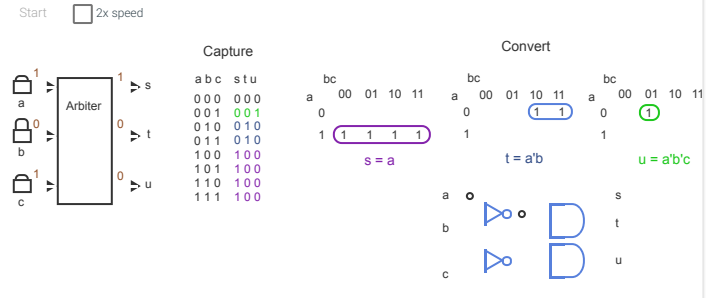
4) If each AND and OR gate input is two transistors, the final circuit requires ____ transistors.

Check Show answer

Arbiter

An ***arbiter*** decides (arbitrates) which of several competing items wins. Ex: If only one button should be pressed at a time but a user presses two or more, an arbiter can decide which pressed button will be recognized. Ex: If two devices simultaneously try to access a resource like a printer, network cable, or storage, an arbiter can decide which device will get access.

PARTICIPATION ACTIVITY 12.4.3: Arbiter circuit, simplified using a K-map.



PARTICIPATION ACTIVITY 12.4.4: Arbiter.

Consider the example above.

1) A keypad may have three buttons but only one should be pressed at a time. An arbiter outputs _____.
   - ○ an indication that two buttons have been pressed
   - ○ exactly one winner of multiple button presses
   - ○ a shock to the user to discourage multiple button presses

2) Suppose a fourth button d were introduced with corresponding output v, and lower priority than c. Based on the equations for s, t, u, what would be the equation for v?
   - ○ v = d
   - ○ v = a'b'c'd
   - ○ Cannot determine

3) Suppose a fourth button d were introduced with corresponding output v, and lower priority than c. Would any of the equations for s, t, u need to be changed?
   - ○ Yes
   - ○ No

4) What is the word for a component that decides which of multiple inputs "wins" a competition?
   - ○ arbitrator
   - ○ arbitor
   - ○ arbiter

Provide feedback on this section