

You've been asked to design some logic to monitor a fancy new orange dispenser, similar to the one shown here. Oranges are loaded in the top, roll down, and get removed from the bottom.

Positions marked A, B, C, and D are equipped with sensors that indicate whether or not an orange is present ('1' = orange present).

Your logic should take signals A, B, C, and D, and produce a signal T that is active when exactly three oranges are present.

You should assume that oranges never get stuck, so e.g. an orange can't be at location D without one also being at C. Use that fact to simplify your logic.

Provide your answer as a Boolean expression.

