Example exercise 8

Tuesday, 28 April 2020 21.54

Construct the ROBDD for the following Boolean expression:

$$x_1 \wedge (\neg x_2 \vee x_1 \vee x_2) \wedge x_3$$

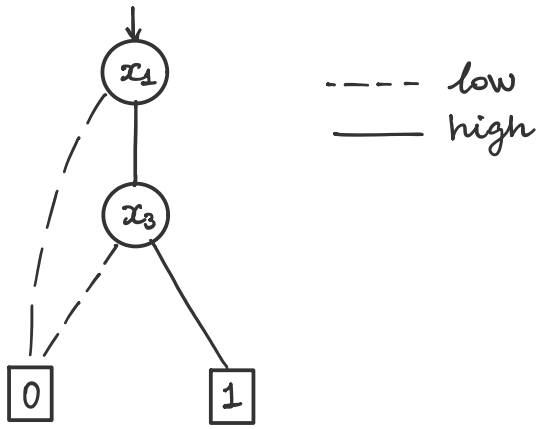
such that $x_1 < x_2 < x_3$.

Solution:

We start by using Shannon's expansion laws to translate the Boolean expression into if-then-else normal form for the given ordering of the variables $x_1 < x_2 < x_3$:

$$x_1 \rightarrow (x_2 \rightarrow (x_3 \rightarrow 0,0), (x_3 \rightarrow 0,0)), (x_2 \rightarrow (x_3 \rightarrow 0,1), (x_3 \rightarrow 0,1))$$

The above can be drawn as a decision graph, and after applying the reduction rules we obtain the following ROBDD:



Notice that we could have obtained the same result by applying the function Build, hence avoiding the need to do the reduction starting from the decision graph obtained via Shannon's expansion.