zigzag manner, then entering the second bridge and traversing it in a zigzag manner, too, thus finally exiting at the right node of the split. Note that we have visited so far all white nodes, but no black node along this path. This brings us to the role of the black nodes. Any two of them are connected by an edge, thus black nodes form a clique. This opens way to visit black nodes and bridges not traversed so far.

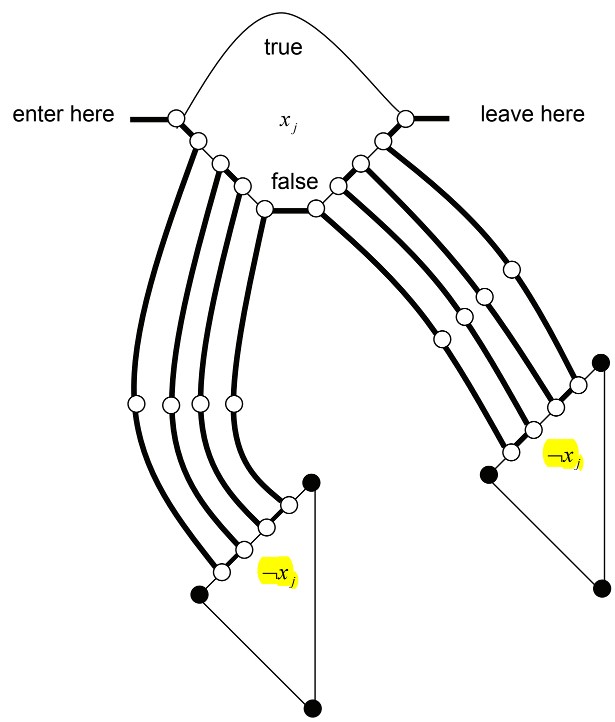

Fig. 5.9. Connecting splits to triangles via bridges with unique "zigzag" traversal

Lemma 5.12.
If formula φ is satisfiable the graph constructed above admits a Hamiltonian path from its start to its goal node.

Proof. Assume that truth-value assignment $\Im$ satisfies at least one literal within each clause of formula φ. Starting with the initial node traverse the arrangement of splits, using edge 'true' of split x_j in case that $\Im$ assigns value 'true' to x_j, and edge 'false' otherwise. Take care that on this traversal through the arrangement of splits every adjacent bridge is traversed in a zigzag manner. Note that for every triangle at least one of its adjacent bridges has been traversed since $\Im$ satisfied at least one literal within each clause. This traversal ends with the rightmost black node at the end of the arrangements of splits.