



Fig. 3.11 Part of the first stage tic-tac-toe tree.

Because of these constraints we can state the following rules for discontinuing the search:

- (1) Search can be discontinued below any *MIN* node having a beta value less than or equal to the alpha value of any of its *MAX* node ancestors. The final backed-up value of this *MIN* node can then be set to its beta value. This value may not be the same as that obtained by full minimax search, but its use results in selecting the same best move.
- (2) Search can be discontinued below any *MAX* node having an alpha value greater than or equal to the beta value of any of its *MIN* node ancestors. The final backed-up value of this *MAX* node can then be set to its alpha value.

During search, alpha and beta values are computed as follows:

- (a) The alpha value of a *MAX* node is set equal to the current largest final backed-up value of its successors.
- (b) The beta value of a *MIN* node is set equal to the current smallest final backed-up value of its successors.