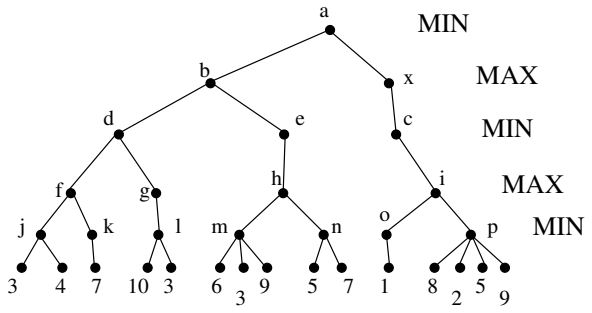
CPSC 3750 – A.I.	**Due Mar. 19** (in class)
Assignment 3	Total marks: 45

1) **(5 pts)** Assign minimax values to all nodes in the following game tree, then describe the optimal play sequence by listing the corresponding sequence of state labels.



2) **(20 pts)** Let's call a player perfect if it never makes mistakes when playing. For example, if MAX is perfect, then it always chooses the move that maximizes the utility (minimax trees are built assuming perfect players).

Prove or disprove the following statements:

(a) Let α be the utility obtained when two perfect players play. Assume now that the game is repeated but the MAX player is imperfect (MAX makes mistakes in that it doesn't choose the move with maximum utility). Then, the new utility obtained is equal or smaller than α.

(b) Like in the previous statement, let α be the utility of a game when both players are perfect. If the game is repeated, MAX plays first and BOTH players make mistakes, then the utility obtained is equal or larger than α.

3) **(10 pts)** Consider a vocabulary with 3 symbols: A, B, C. How many models are there for the following sentences:

(a) $(A \wedge B) \vee (B \wedge C)$

(b) $A \vee B$

(c) $A \wedge B \wedge C$

(d) $A \Leftrightarrow B \Leftrightarrow C$

4) **(10 pts)** Consider the minesweeper computer game (`http://en.wikipedia.org/wiki/Minesweeper_(computer_game)`). Let X_{ij} be true if square (i, j) has a mine. Write down a sentence in propositional logic that asserts that there are exactly two mines adjacent to square $(1, 1)$ where $(1, 1)$ is the bottom left corner of the board. Then generalize the sentence to assert that k of n neighbours contain mines.