CS-171, Intro to A.I. — Quiz#2 — Winter Quarter, 2015 — 20 minutes

YOUR NAME AND EMAIL ADDRESS: _____

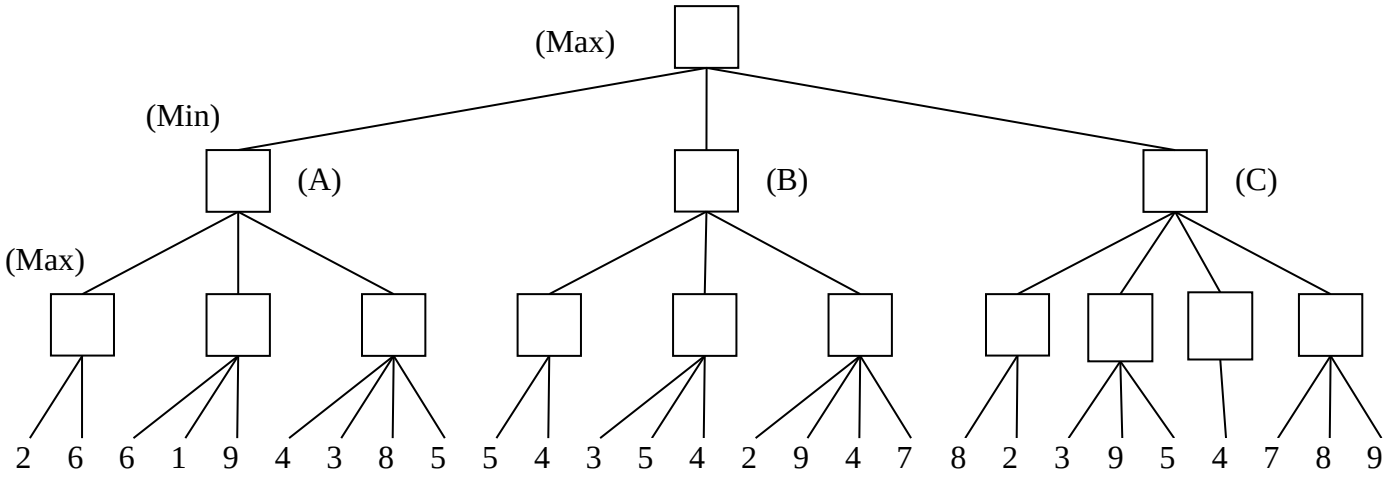
YOUR ID: _____ ID TO RIGHT: _____ ROW: _____ SEAT: _____

1. (25 pts total, -5 pts for each error, but not negative) MINI-MAX SEARCH IN GAME TREES.
The game tree below illustrates a position reached in the game. Process the tree left-to-right. It is **Max**'s turn to move. At each leaf node is the estimated score returned by the heuristic static evaluator.

1.a. Fill in each blank square with the proper mini-max search value.

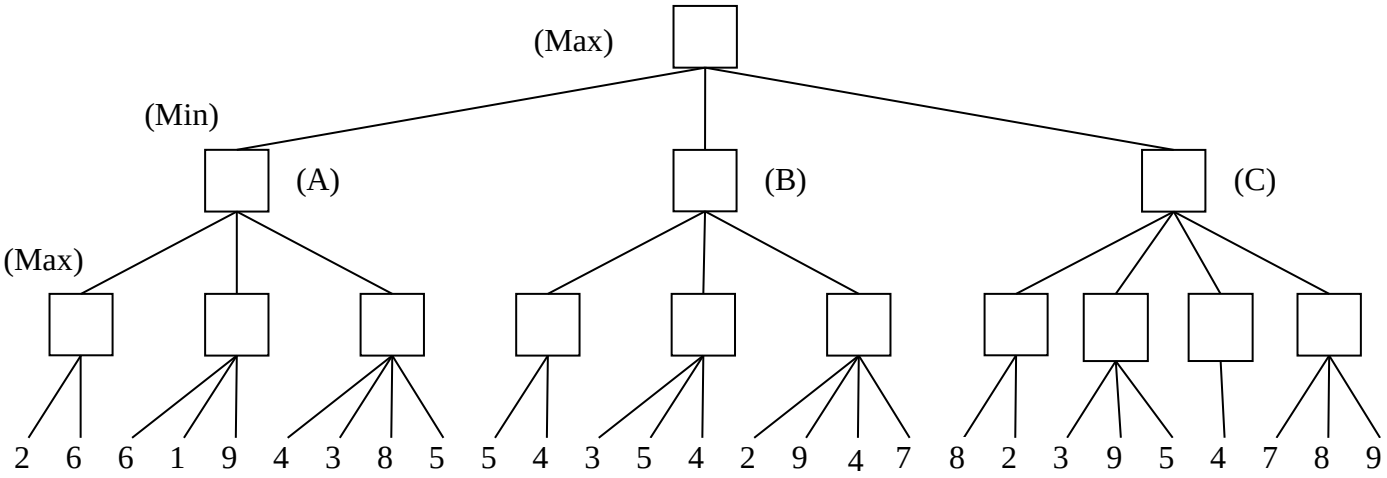
1.b. What is the best move for Max? (write A, B, or C) _____

1.c. What score does Max expect to achieve? _____



2. (25 pts total, -5 for each error, but not negative) ALPHA-BETA PRUNING. Process the tree left-to-right. This is the same tree as above (1.a). You do not need to indicate the branch node values again.

Cross out each leaf node that will be pruned by Alpha-Beta Pruning.



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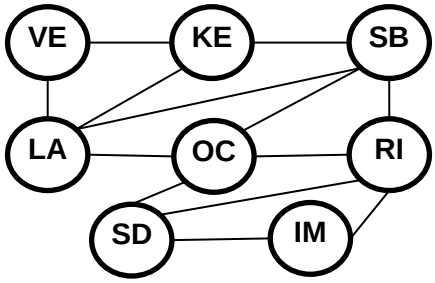
3. (50 points each, 10 pts each) Constraint Satisfaction Problems



IM = Imperial
KE = Kern
LA = Los Angeles
OC = Orange
RI = Riverside
SB = San Bernardino
SD = San Diego
VE = Ventura

You are a map-coloring robot assigned to color this map of Southern California counties. Adjacent regions must be colored a different color (R=Red, B=Blue, G=Green). The constraint graph is shown.

3a. (10 pts total, -5 each wrong answer, but not negative) FORWARD CHECKING. LA has been assigned value B, as shown. Cross out all values that would be eliminated by Forward Checking:

IM	KE	LA	OC	RI	SB	SD	VE
R G B	R G B	B	R G B	R G B	R G B	R G B	R G B

3b. (10 pts total, -5 each wrong answer, but not negative) ARC CONSISTENCY.
LA has been assigned B and OC has been assigned R, as shown; but no constraint propagation has been done. Cross out all values that would be eliminated by Arc Consistency (AC-3 in your book).

IM	KE	LA	OC	RI	SB	SD	VE
R G B	R G B	B	R	R G B	R G B	R G B	R G B

3c. (10 pts total, -5 each wrong answer, but not negative) MINIMUM-REMAINING-VALUES HEURISTIC. Consider the assignment below. RI has been assigned B and constraint propagation has been done, as shown. List all unassigned variables (in any order) that might be selected now by the Minimum-Remaining-Values (MRV) Heuristic: _____.

IM	KE	LA	OC	RI	SB	SD	VE
R G	R G B	R G B	R G	B	R G	R G	R G B

3d. (10 pts total, -5 each wrong answer, but not negative) DEGREE HEURISTIC. Consider the assignment below. (It is the same assignment as in problem 3c above.) RI has been assigned B and constraint propagation has been done, as shown. Ignoring the MRV heuristic, list all unassigned variables (in any order) that might be selected now by the Degree Heuristic (DH) _____.

IM	KE	LA	OC	RI	SB	SD	VE
R G	R G B	R G B	R G	B	R G	R G	R G B

3e. (10 pts total) MIN-CONFLICTS HEURISTIC. Consider the complete but inconsistent assignment below. SD has been selected to be assigned a new value (its old value was replaced by "?"). What new value would be chosen below for SD by the Min-Conflicts Heuristic? _____.

IM	KE	LA	OC	RI	SB	SD	VE
R	R	B	R	B	G	**?**	R