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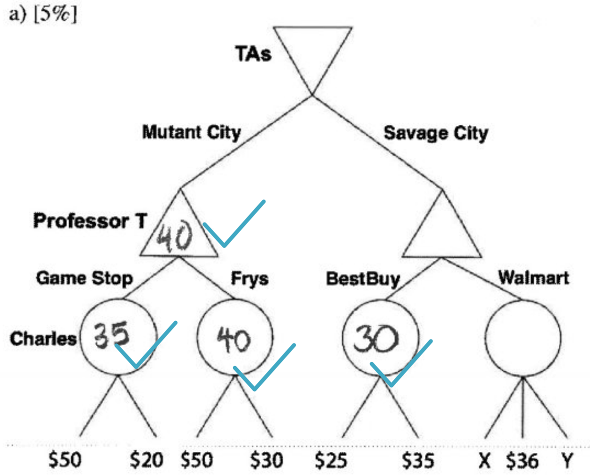
#8 2 of 10

1. [15%] Birthday Gift

a) [5%]

Q1a 5



b) [5%]

If X>44, then regardless of Y,
WalMart will have E>40
Prof. T will choose WalMart, 40>30
TA's will choose Mutant City, SC>40
SC>M

Correct Savage City Value. Wrong answer. Missing formula 1

Q1b 1

c) [5%]

Let Y= max value = 30: then to result in a video game
from BestBuy, $30 > \frac{X+30+36}{2} \rightarrow X<-6$
When X<-6, then E[Walmart] < E[BestBuy]
Prof T. will choose Best Buy,
TA's will choose Savage City → Prof

Correct Walmart > 1 1

Wrong answer. Wrong formula

Q1c 1

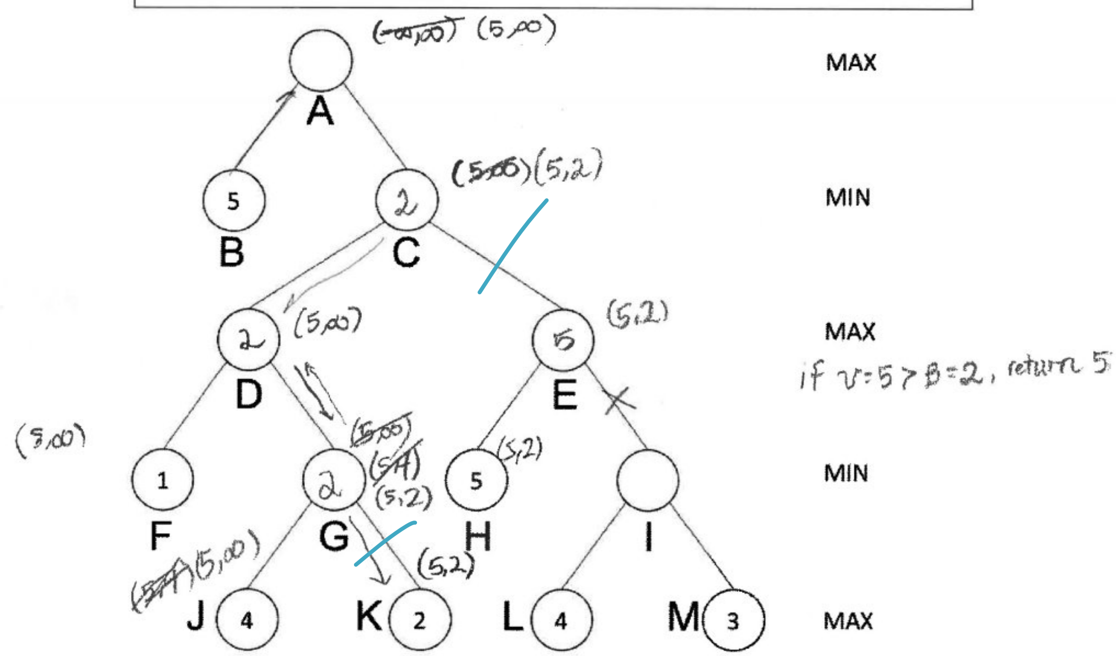
Exam 1 Version A

2. [20%] Game Playing

a1) [2%]

5

Q2a1 2



a2) [8%]

α-β prunes I, L, M.

(α, β) →

A: (5,∞) F: (5,∞)
B: (5,∞) G: (5,2)
C: (5,2) J: (5,∞)
D: (5,∞) K: (5,2)
E: (5,2) H: (5,2)

Q2a2 2

Exam 1 Version A

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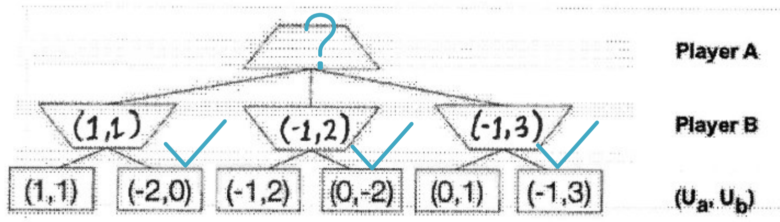
Qb1 2

b1) [3%]



b2) [4%]

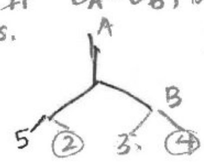
In α-β pruning, the criterion for pruning is when $\alpha \geq \beta$. Consider when $U_A(s) = U_B(s)$. Both A and B are maximizing the same nodes. Then $\alpha \leftarrow \max(\alpha, v)$ and $\beta \leftarrow \max(\beta, v)$. But when we reach a node where $v \leq \alpha$, we cannot prune the rest of the tree, because the min node is seeking a higher value than v. So, we will never prune in a general non-zero sum game.

Qb2 0

there is no alpha beta and min node in this case

b3) [3%]

Yes. If $U_A = U_B$, both A and B are maximizing the same nodes.



In the example tree, if B chooses 2 instead of 5, it is a suboptimal choice because it should have chosen the max. U_A could have been 5, but it is now 4.

Qb3 3

Exam 1 Version A

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#8 5 of 10

3. [30%] Search Algorithms

Incorrect sequence or/and node expand

No Partial credit for all

1) [5%]

Expanded nodes: S, A, B, C

Solution path: S, A, G_1 (optimum path regardless of cost)

Q3-1 0

2) [5%]

Expanded nodes: S, A, C, J, H

Solution path: S A C J H G_2

Q3-2 0

3) [5%]

Expanded nodes: S A B E H F I J

Solution path: S A C G_1 (cost 6)

Q3-3 0

4) [5%]

Exp. nodes: S B E H

Sol. path: S B E H G_2

Q3-4 0

5) [5%]

Exp nodes: S B E H A C F I

Sol path: S B E H G_2 (path cost 10)

Q3-5 0

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a) [3%]

Yes, the heuristic is admissible. It is always 0 or greater.

Q5a 3

b) [2%]

Yes, it could, an admissable heuristic won't guarantee optimality in A* search.

Q5b 2

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#8 7 of 10

4. [10%] General AI Knowledge

1	■	F	6	■	F
2	■	F	7	■	F
3	T	■	8	T	■
4	■	F	9	T	■
5	■	F	10	T	■

Q4 6

5. [10%] Multiple Choice

1	A[ ]	B[ ]	C[■]	D[ ]	E[ ]
2	A[ ]	B[ ]	C[ ]	D[■]	E[ ]
3	A[ ]	B[ ]	C[■]	D[ ]	E[ ]
4	A[■]	B[ ]	C[■]	D[ ]	E[ ]
5	A[■]	B[ ]	C[ ]	D[ ]	E[ ]

Q5 4

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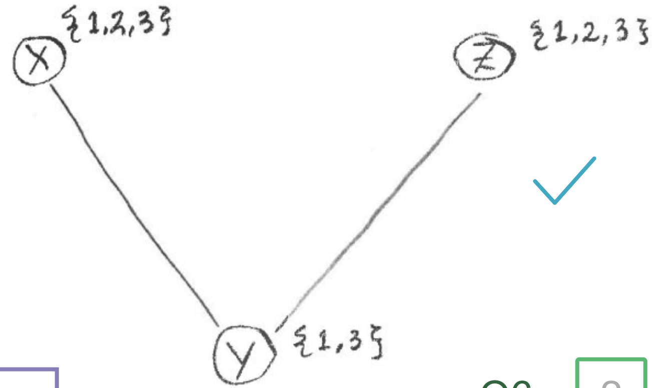
6. [15%] Constraint Satisfaction

a) [3%]



improper domain values **-1**

Q6a 2

b) [4%]

After arc consistency, we see that
C_1's constraint [(2,2) to be allowed]
no longer holds, because y cannot be 2
because of C_2.
So, 2 is no longer in x's domain
$x \rightarrow \{1,3\}$

Q6b 4

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c) [4%]

After forward checking, we rule out 3 from y, since only (1,1) is allowed in C_1.

$y \to \{1\}$

only one correct. -2

Q6c 2

d) [4%]

To maintain arc consistency, we add X to the queue.
$X \to \{1\}$, we choose $X = 1$
$X \to Y$, so we add Y to queue.
$Y \to Z$, so we add Z to queue.
Checking Y, when $X \to \{1\}$, only (1,1) is allowed from C_1. So, $\boxed{Y \to \{1\}}$ We rule out 3 from Y.
Checking Z, when $Y \to \{1\}$, only (1,1) and (1,2) is allowed from C_2. We rule out 3 from Z.
So $\boxed{Z \to \{1,2\}}$.

Q6d 4

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