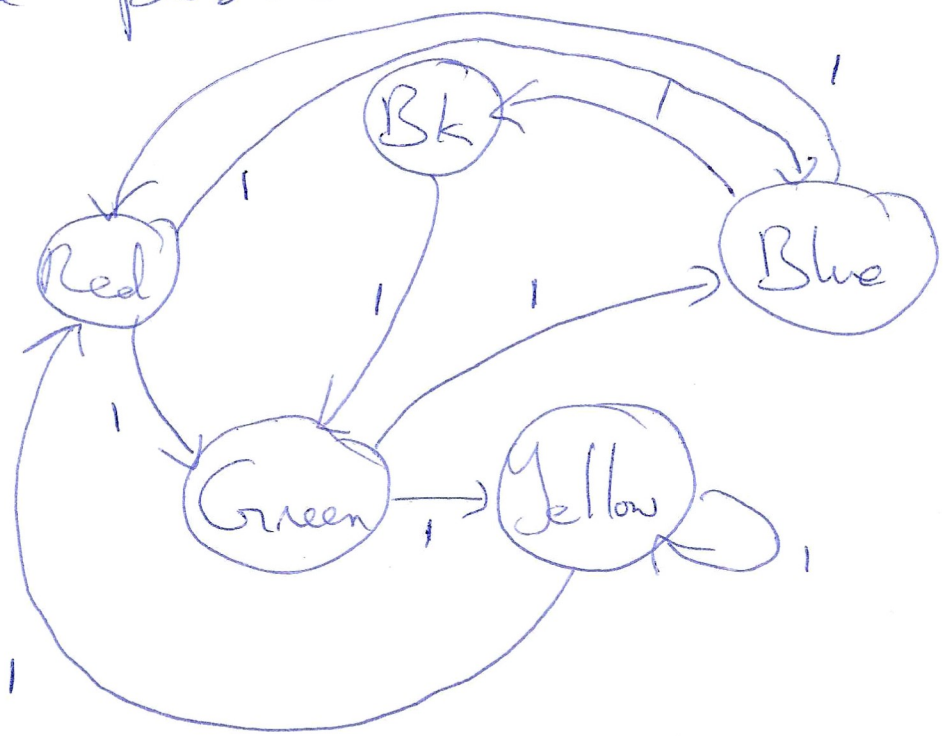
Quiz 2

Samples Solution

TASK 1

Consider a Toy version of the problem where there is only one ~~node~~ state per each color and the problem looks like this



The exact solution to this problem is the heuristic for the original problem

$$h(\text{Red}) = 2$$

$$h(\text{Blue}) = 1$$

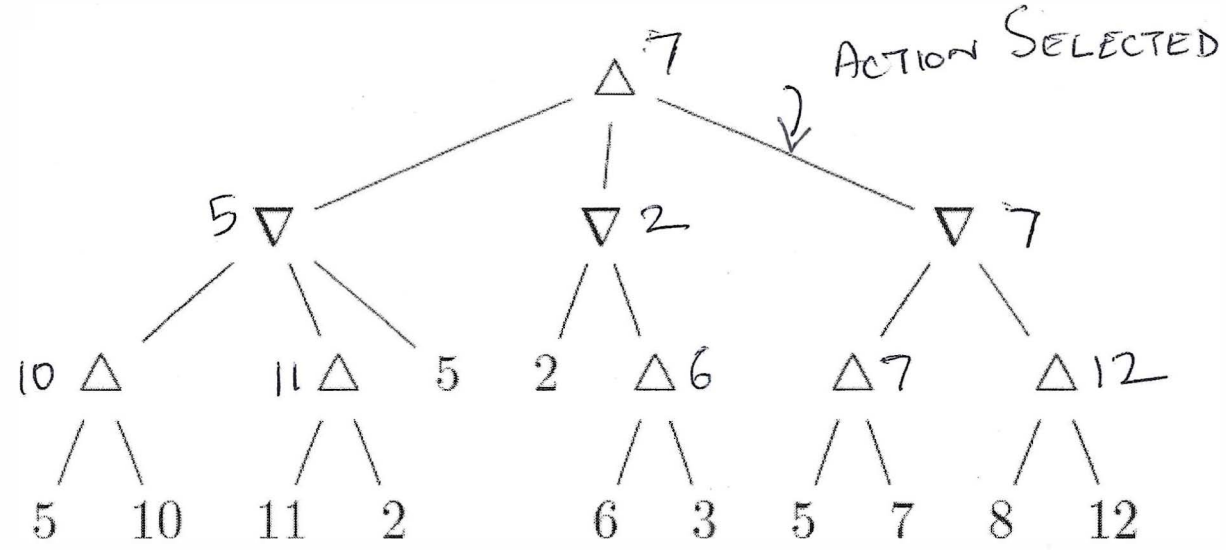
$$h(\text{Green}) = 2$$

$$h(\text{Yellow}) = 3$$

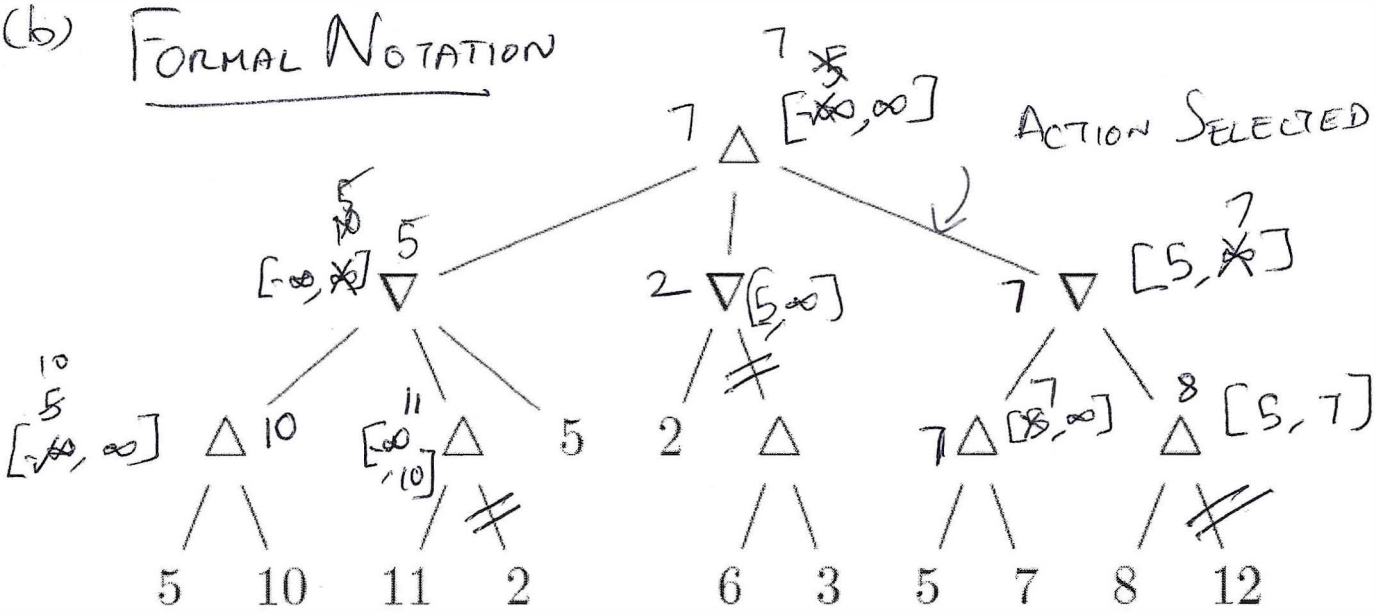
$$h(\text{Black}) = 0$$

TASK 2

(a)

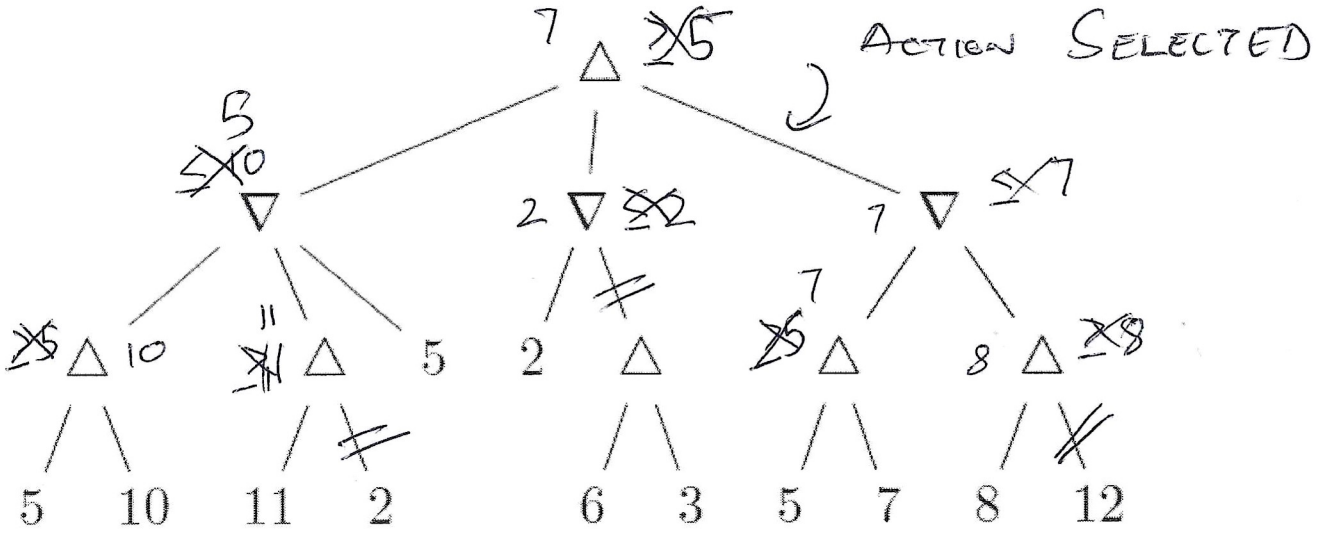


(b) FORMAL NOTATION



Same as Minmax.

INFORMAL NOTATION



(c)

Any Max node can prune all successors once it gets a value of 12.

Any Min node can prune all successors once it gets a value of 2.

Task 3

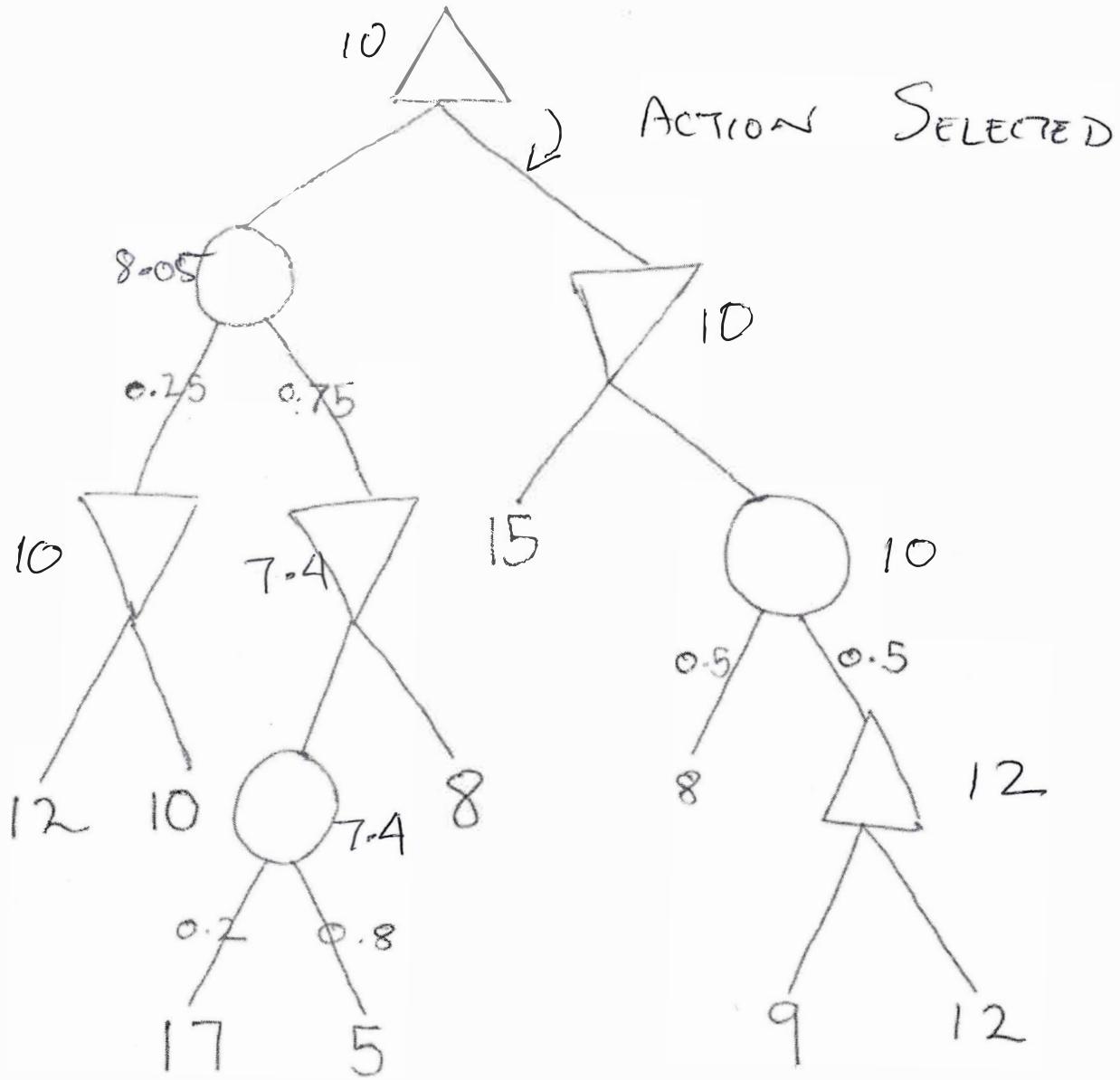
Since DeepGreenMove gives us the exact outcome of the MIN players move, the MIN-VALUE function does not need to iterate through all possible actions in the MIN state

```
function MIN-VALUE(state) returns a utility value
    if TERMINAL-TEST(state) then return UTILITY(state)
    return MAX-VALUE(DEEPGREENMOVE(state))
```

If DeepGreen is an optimal player, this version of MINMAX will return same strategy as standard MINMAX. However it would have explored far fewer nodes

If DeepGreen is sub-optimal player, this version of MINMAX would take advantage of it and return highest possible payoff agast DeepGreen while still exploring far fewer nodes.

Task 4

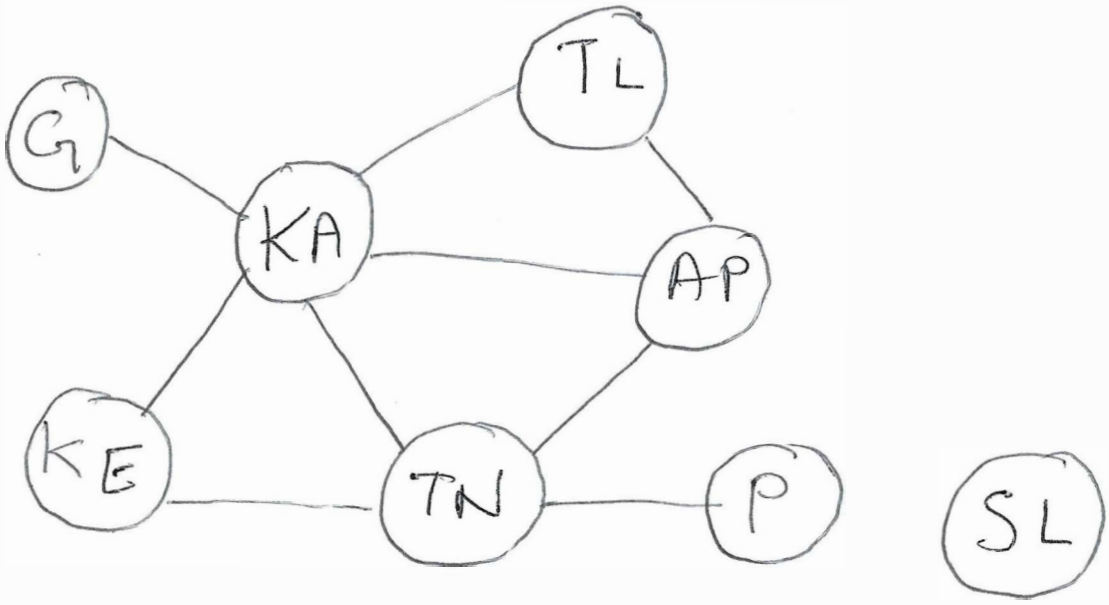


Possible Payoffs for following this strategy: 8, 12

MIN: 8 MAX: 12

Task 5

(a)



(b)

	Remaining Values	Degree Heuristic	Variable Selected
1.	3	5	KA
2.	2	3	TN
3.	1	1	AP
4.	1	0	TL
5.	1	0	KE
6.	2	0	G
7.	2	0	P
8.	3	0	SL

(c)

G	KA	AP	TL
~~R~~ GB	R	~~R~~ GB	~~R~~ GB

KE	TN	P	SL
~~R~~ GB	~~R~~ GB	RGB	RGB

Arcs To Check:

~~G → KA~~
~~TL → KA~~
~~AP → KA~~
~~TN → KA~~
~~KE → KA~~

~~KE → TN~~
~~KA → TN~~
~~AP → TN~~
~~P → TN~~
~~KA → KE~~
~~TN → KE~~

Addl Arcs:

~~KA → G~~
~~KA → TL~~
~~AP → TL~~
~~TL → AP~~
~~KA → AP~~
~~TN → AP~~

Since every Variable has atleast one value left after checking all the arcs, Arc Consistency Check Passed.

(d)

- SL can be solved as its own subproblem

- If KA has an assignment made, the remaining variables can be solved as a TREE-STRUCTURED CSP.

(e)

KA : R

TM : G

AP : B

TL : G

KE : B

GR : G

P : R

SL : R

is a possible solution.