AI - Assignment 6

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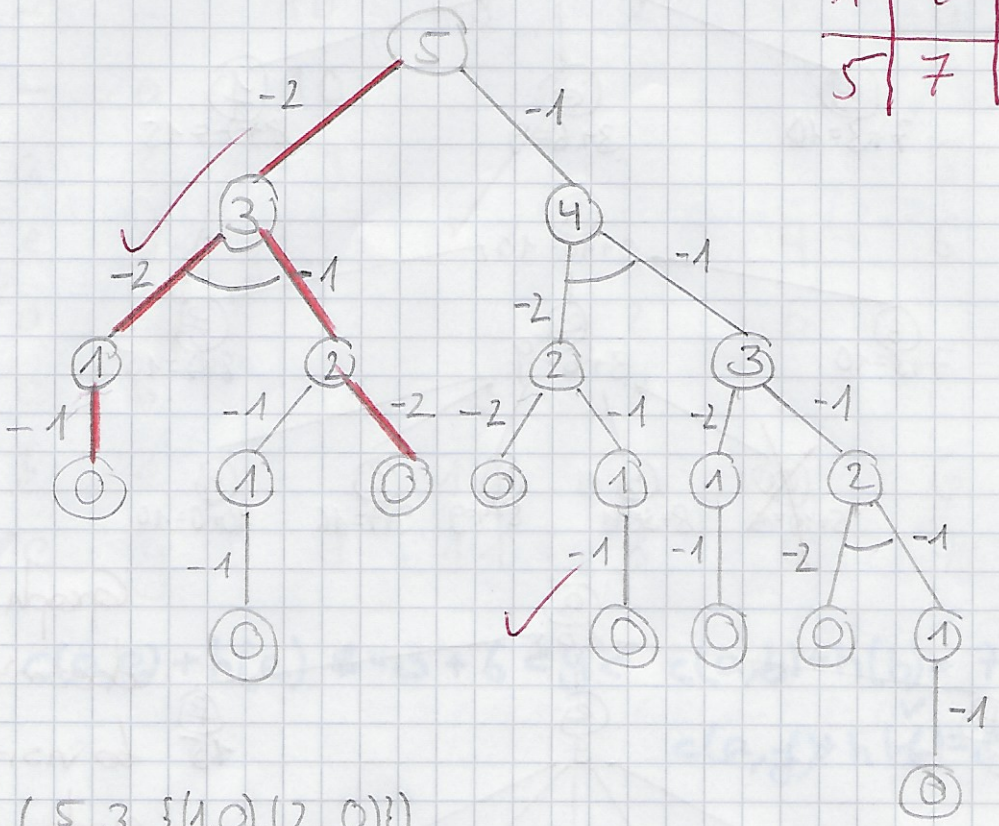
1	2	3	Σ
5	7	6	18

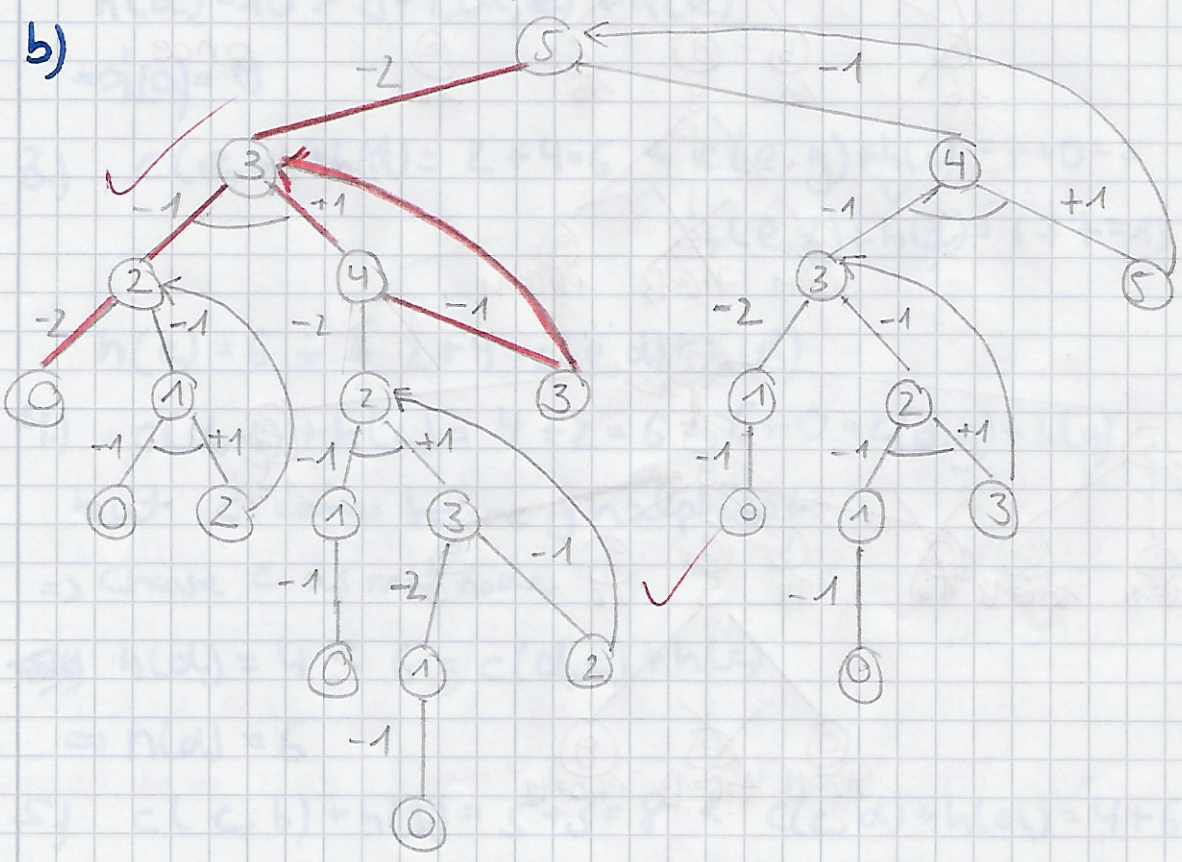
Question 1:

a)



Path: (5, 3, {(1, 0), (2, 0)})

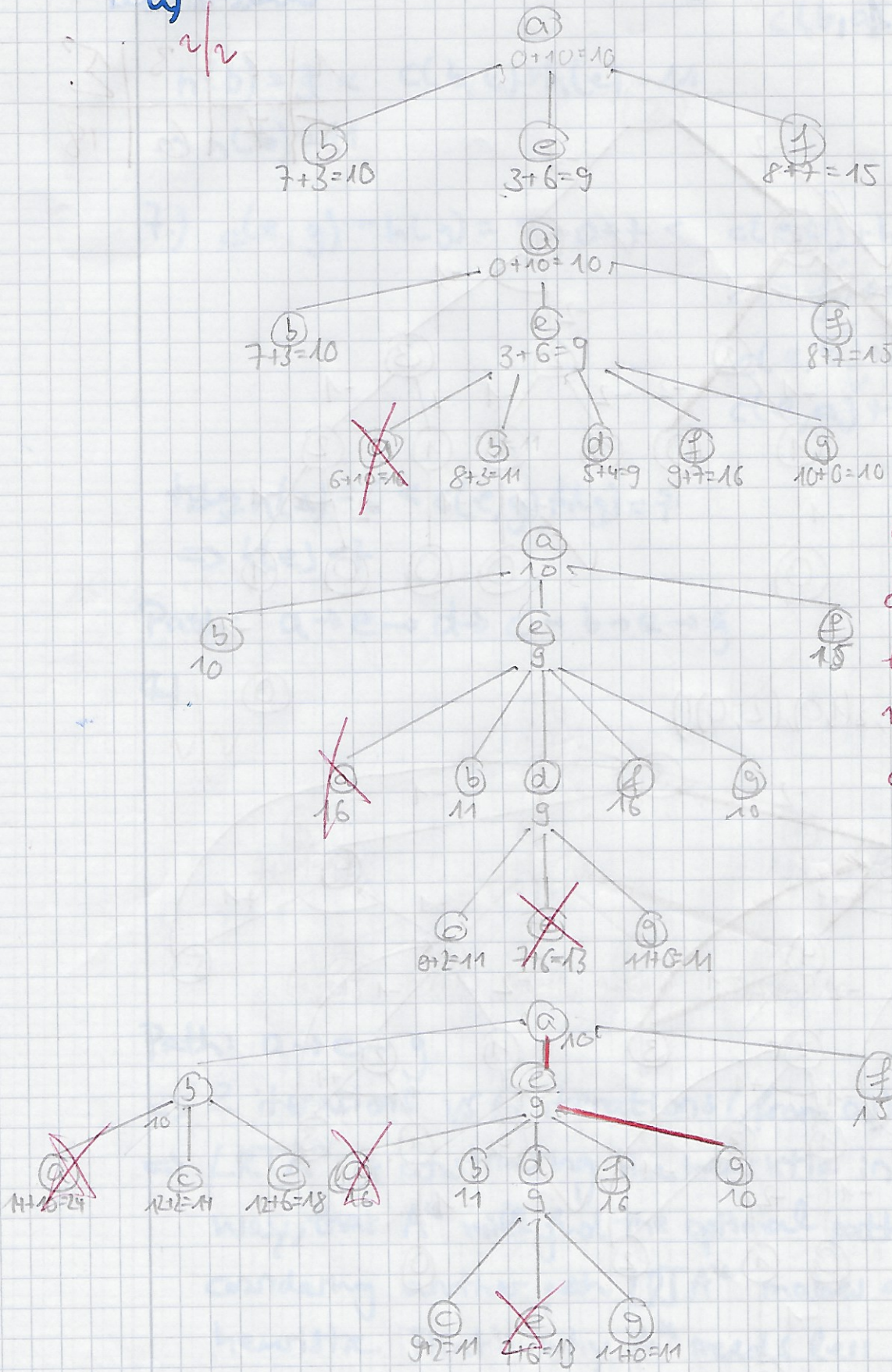
b)



We have to add cycles into the tree, otherwise there would be paths that would never find any solution in the tree. In such a case, we now loop back and will reach nondeterministically a leaf/goal by probability 1. under what conditions?

Question 2

a) 2/2



Graph search doesn't allow you to visit the same node more than once.

Optimal path: a → e → g

cost: 10

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b) n/n

	a	s	s'	H(a)	H(b)	H(c)	H(d)	H(e)	H(f)	H(g)
	–	–	–	10	3	2	4	6	7	0
1	–	–	a	10	"				"	
2	↗	a	e	9				6		
3		e	d				4	6		
4		d	c			2	6			
5		c	b		3	8				
6		b	e		11			6		
7		e	g	9	11	8	6	7	7	0

2.) $c(a,e)+h(e) = 3+6 = 9 <$ $c(a,b)+h(b) = 7+3 = 10$
$c(a,f)+h(f) = 8++ = 15$

$h(a) = 10 > 9 = c(a,e)+h(e)$
$\Rightarrow h(a) = 9$

3.) $c(e,d)+h(d) = 2+4 = 6 <$ $c(e,g)+h(g) = 7+0 = 7$
$c(e,f)+h(f) = 6+7 = 13$

$h(e) = 6 = 2+4 = c(e,d)+h(d)$

4.) $c(d,c)+h(c) = 4+2 = 6 = 6+0 = c(d,g)+h(g)$
but c comes before g in alphabet
=> Choose c as next node

$h(d) = 4 < 6 = c(d,c)+h(c)$
$\Rightarrow h(d) = 6$

5.) $c(c,b)+h(b) = 5+3 = 8 <$ $c(c,d)+h(d) = 4+6 = 10$
$h(b) = 2 < 8 = c(c,b)+h(b)$
$\Rightarrow h(c) = 8$

6.) $c(b,e)+h(e) = 5+6 = 11 <$ $c(b,c)+h(c) = 5+8 = 13$
$c(b,a)+h(a) = 7+9 = 16$

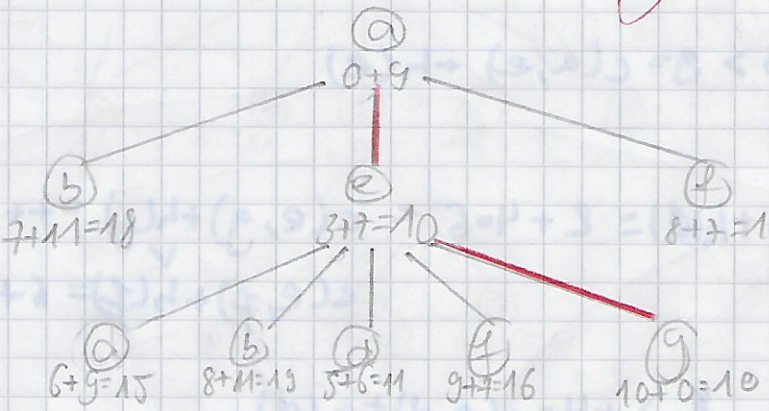
$h(b) = 3 < c(b,e)+h(e) = 11$
$\Rightarrow h(b) = 11$

7.) $c(e,g)+h(g) = 7+0 = 7 <$ $c(e,d)+h(d) = 2+6 = 8$
$c(e,f)+h(f) = 6+7 = 13$
$c(e,b)+h(b) = 5+11 = 16$
$c(e,a)+h(a) = 3+9 = 12$

$h(e) = 6 < c(e,g)+h(g) = 7$
$\Rightarrow h(e) = 7$

Path: a → e → d → c → b → e → g

8.)



Path: a → e → g
$\Rightarrow$ 2 iterations vs 6 iterations (from a))
$\Rightarrow$ LRTA* is constructing the heuristic in such a way, that A* will find the optimal path without considering another path. LRTA* makes a better heuristic. That's why A* needs less steps because the heuristic is better.

Question3

Source Code in Klias.