Exercise 2

Early tree: activities scheduled as early as possible (more fat lines indicate the early tree)

$F_1 = 0$

$F_2 = 1$

$F_3 = 2$

$F_4 = 4$

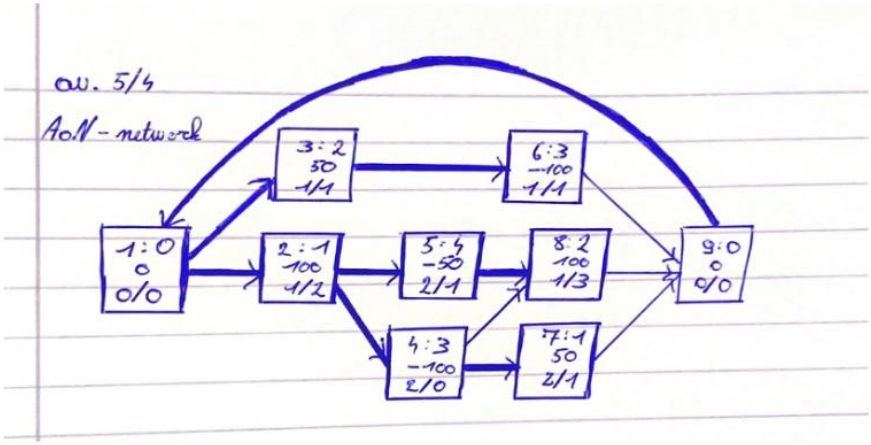
$F_5 = 5$

$F_6 = 5$

$F_7 = 5$

$F_8 = 7$

$F_9 = 8$



We have an resource constraint for resource_type_1 = 5 and resource_type_2 = 4.

The only forbidden set where we have an resource conflict is when activity 6,7 and 8 are all active in the same time period, we will have to avoid this scenario, all other sets of combinations are possible (with respect to the order of activities).

Recursive Search:

We start the current tree with a copy of the early tree

Recursion (1)

SA={1}, CA={1} and DC=0.00

Recursion (3): successor node 3

SA={3}, CA={1,3} and DC=49.01 (=50*$e^{-0.01*2}$)

Recursion (6): successor node 6

SA={6}, CA={1,3,6} and DC=-95.12 (=(-100)*$e^{-0.01*5}$)

SA'={6} and DC'=-95.12

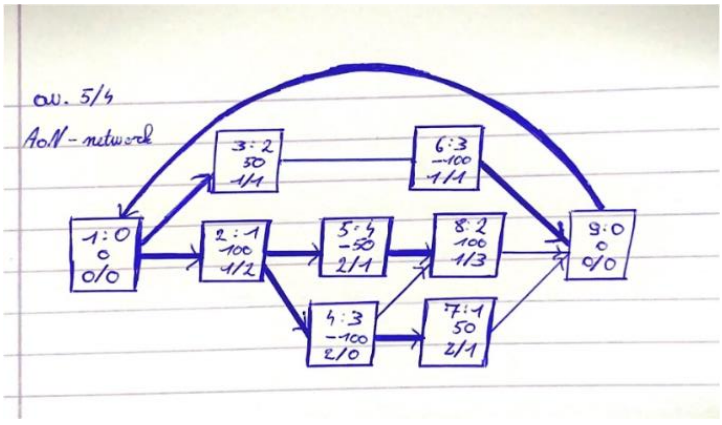
Shift activity 6

Delete (3,6) from CT

$V_{6,9}$ = 8-0-5 = 5

Add (6,9) to CT

$F_6 = 8$



Recursion (1)

SA={1}, CA={1} and DC=0.00

recursion (2): successor node 2

SA={2}, CA={1,2} and DC=99.00 (=100*$e^{-0.01*1}$)

Recursion (5): successor node 5

SA={5}, CA={1,2,5} and DC=-47.56 (=(-50)*e-0.01*5)

Recursion (8): successor node 8

SA={8}, CA={1,2,5,8} and DC=93.24 (=100*$e^{-0.01*7}$)

SA'={5,8} and DC'=45.68 (=(-47.56)+93.24)

SA'={2,5,8} and DC'=144.68 (=45.68+99.00)

Recursion (4): successor node 4

SA={4}, CA={1,2,4} and DC=-96.08 (=(-100)*$e^{-0.01*4}$)

Recursion (7): successor node 7

SA={7}, CA={1,2,4,7} and DC=47.56 (=50*$e^{-0.01*5}$)

SA'={4,7} and DC'=-48.52 (=(-96.08)+47.56)

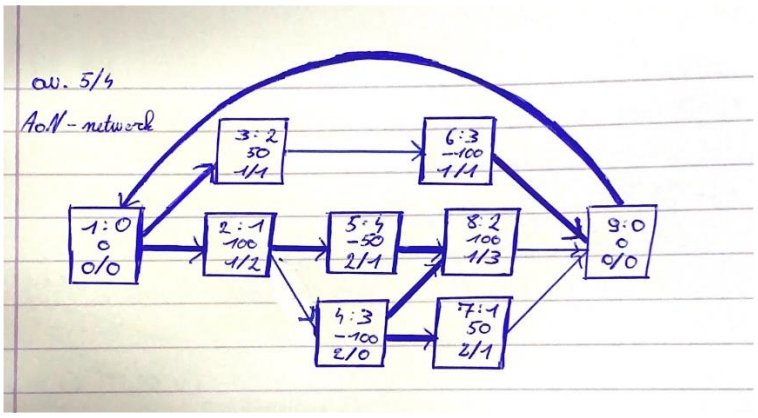
Shift activity 4 and activity 7

Delete (2,4) from CT

$V_{4,8}$ = 7-2-4 = 1

Add (4,8) to CT

F_4 = 5 ; F_7 = 6



This is the CT now and this will not change anymore

Recursion (1)

SA={1}, CA={1} and DC=0.00

Recursion (3)

SA={3}, CA={1,3} and DC= 49.01 (=50*$e^{-0.01*2}$)

SA'={1,3} and DC=49.01

Recursion (2): successor node 2

SA={2}, CA={1,2} and DC=99.00 (=100*$e^{-0.01*1}$)

Recursion (5): successor node 5

SA={5}, CA={1,2,5} and DC=-47.56 (=(-50)*$e^{-0.01*5}$)

Recursion (8): successor node 8

SA={8}, CA={1,2,5,8} and DC=93.24 (=100*$e^{-0.01*7}$)

SA'={5,8} and DC'=45.68 (=(-47.56)+93.24)

Recursion (4): predecessor node 4

SA={4}, CA={1,2,4,5,8} and DC=-95.12 (=(-100)*$e^{-0.01*5}$)

Recursion (7): successor node 7

SA={7}, CA={1,2,4,5,7,8} and DC=47.09 (=50*$e^{-0.01*6}$)

SA'={4,7} and DC'=-48.03 (=(-95.12)+47.09)

SA'={4,5,7,8} and DC'=-2.35 (=(-48.03)+45.68)

SA'={2,4,5,7,8} and DC'=96.65 (=(-2.35)+99.00)

SA'={1,2,4,5,7,8} and DC'=96.65 (=96.65+0.00)

Recursion (3): successor node 3

SA={3}, CA={1,2,3,4,5,7,8} and DC=49.01 (=50*$e^{-0.01*2}$)

SA'={1,2,3,4,5,7,8} and DC'=145.66 (=96.65+49.01)

Recursion (9): predecessor node 9

SA={9}, CA={1,2,3,4,5,7,8,9} and DC=0.00

Recursion (6): predecessor node 6

SA={6}, CA={1,2,3,4,5,6,7,8,9} and DC=-91.39 (=(-100)*$e^{-0.01*9}$)

SA'={6,9} and DC'=-91.39 (=0+(-91.39))

SA'={1,2,3,4,5,6,7,8,9} and DC'=54.27 (=145.66+(-91.9))

We have an upper bound of 54.27

We check for the resource constraint:

We check which activities are ongoing at t=…

t=0 : 1,2,3

t=1 : 3,5

t=2 =: 5,4

t=3 : 5,4

t=4 : 5,4

t=5 : 8,7

t=6 : 8,6

t=7 : 6

t=8 : 6

The activities which can possibly cause a resource conflict are underlined, we see that they are not all 3 active in the same period, so we do not have a resource conflict.