

## Assignment 2

### (b) Analysis

Reachability analysis of petri net 2a:

No.	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	p11	p12	p13	p14	p15	p16	p17	Firing transition
M0	1																	t1 -> M1
M1		1																t2 -> M2
M2			1															t3 -> M1, t4 -> M3
M3				1														t5 -> M4
M4					1													t6 -> M5, t7 -> M6
M5						1												t8 -> M7
M6							1											t9 -> M7
M7								1										t10 -> M8, t11 -> M9
M8									1									t12 -> M10
M9										1								t13 -> M10
M10											1							t14 -> M11
M11												1	1					t15 -> M12, t16 -> M13
M12													1	1				t16 -> M14
M13												1			1			t15 -> M14
M14														1	1			t17 -> M15
M15																1		t18 -> M16
M16																	1	End

### Interpret your results and discuss whether your model is

#### \* sound

As defined in the lecture process models are structurally sound if there is exactly one initial node, one end node and each node is on the path from initial to end.

\*The petri net is sound, as it is safe, i.e., no place holds more than one token. The aspect of proper completion is given as there are no token left when the sink place (p17) is marked (M16). The option to complete, as seen in M16, is fulfilled. There is an absence of dead parts of the model, every transition can be fired along the firing sequence.

\*The soundness considerations and explanations are based upon the soundness definition from Wil van der Aalst and his book "Process Mining: Data Science in Action" second edition, Springer. (p. 65-66)

#### \* bounded

The model is 1-bounded aka safe. M0 – M16

#### \* safe

The model is 1-bounded aka safe. M0 – M16

#### \* and live

The petri net is not live. When the final marking M16 is reached there is no possibility to redo parts / the whole net, there are no transitions that are enabled. We'd have to introduce an additional transition, let's call it  $t'$  that connects p1 and p17 to make the model live.