Feedback — Quiz Week 3

Help Center

Thank you. Your submission for this quiz was received.

You submitted this quiz on **Mon 2 Nov 2015 10:26 PM CET**. You got a score of **3.50** out of **5.00**. You can attempt again, if you'd like.

We would like to repeat that for certain questions multiple variants exist. Therefore, in case you are taking this quiz multiple times, some questions will be (subtly) different.

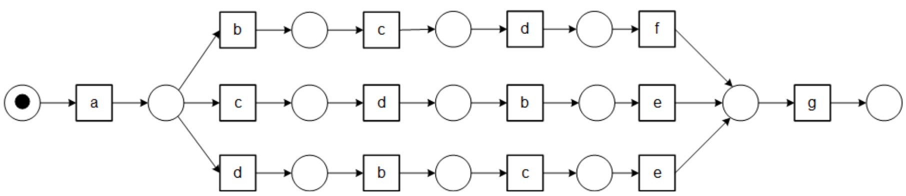
Question 1

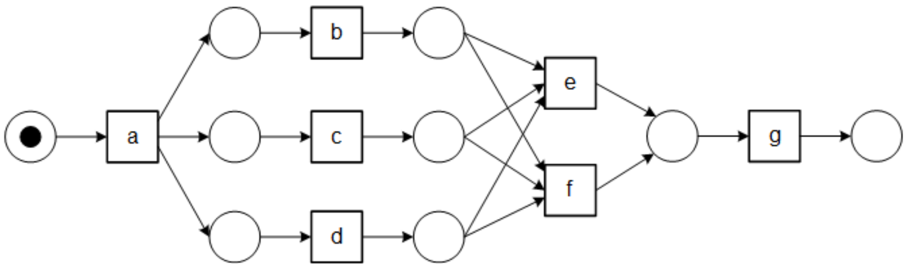
Given the event log below, which of the following process models scores perfect on both **replay fitness** (ability to explain the observed behavior) and **precision** (not describing unobserved behavior).

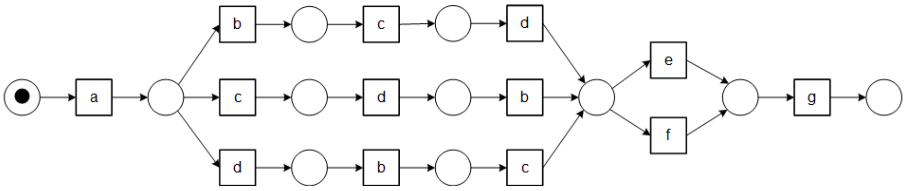
$< a,b,c,d,f,g >^{1000}$

$< a,c,d,b,e,g >^{1000}$

$< a,d,b,c,e,g >^{1000}$

Your Answer		Score	Explanation
	✔	0.50	This is indeed the only process model that is able to perfectly replay all three traces of the event log (i.e. perfect fitness) and at the same time does not allow for additional behavior that is not seen in the event log.





Total	0.50 / 0.50

Question Explanation

The quality criteria are discussed in more detail in lecture 3.1: 'Four quality criteria for process discovery'.

Question 2

The representational bias in process mining is...

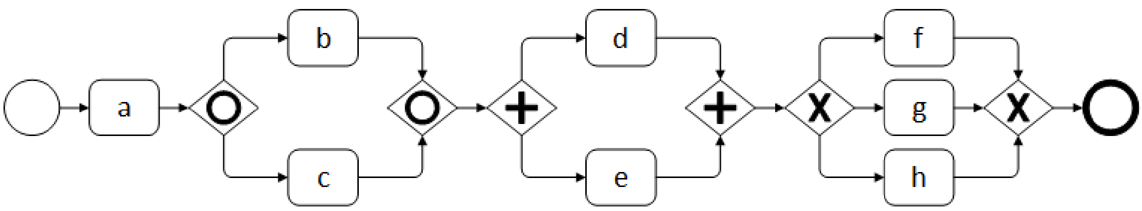
Your Answer		Score	Explanation
...whether we are able to discover concurrency or OR-constructs easily.			
...the activities of which the process consists.			
...the way we visualize the discovered process model.			
...the notation used (internally) by the process discovery algorithm and the expressive limitations of the internal notation.	✔	0.50	This is indeed the representational bias in process mining. If the notation used by the process discovery technique has certain limitations then the technique is also restricted by these limitations.
Total		0.50 / 0.50	

Question Explanation

Lecture 3.2, "On the representational bias of process mining" discusses representational bias in-depth.

Question 3

How many unique traces are possible in the following BPMN model?



Your Answer		Score	Explanation
6			
24	✔	0.50	
48			
12			
18			
Total		0.50 / 0.50	

Question Explanation

The process model can be divided in four 'chunks':

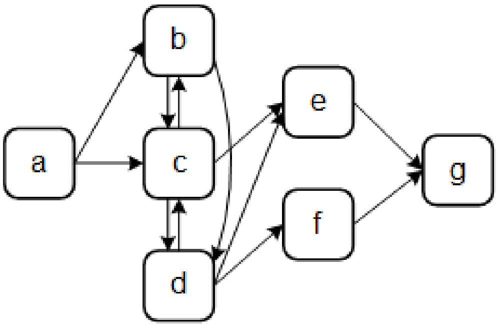
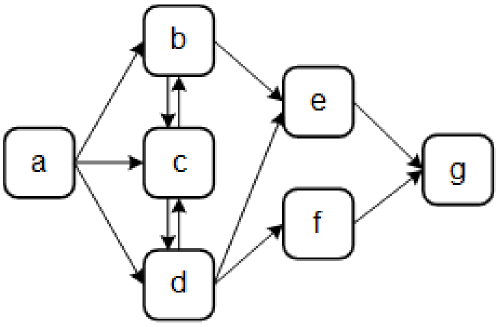
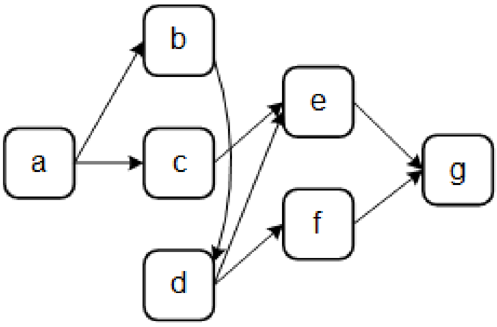
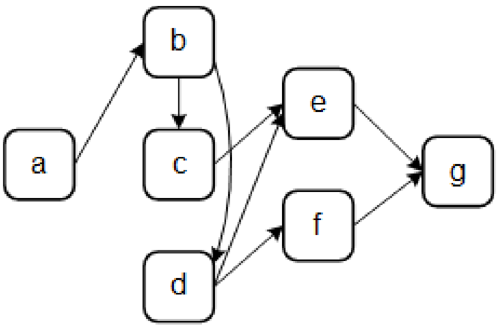
1. Activity a: 1 possible trace
2. The OR construct between activities b and c: 4 possible traces (< b >, < c >, < b,c > and < c,b >)
3. The parallel construct between activities d and e: 2 possible traces (< d,e > and < e,d >)
4. The choice between activites f,g, and h: 3 possible traces (< f >, < g > and < h >)

Hence $1 \times 4 \times 2 \times 3 = 24$ possible traces.

The Business Process Modelling and Notation (BPMN) is explained in more detail in lecture 3.3: 'Business Process Modelling and Notation (BPMN)'.

Question 4

Which one of the dependency graphs shown below correctly describes the relations in the following event log: [< a,b,c,d,e,g > , < a,c,b,d,f,g > , < a,b,d,c,e,g >]?

Your Answer		Score	Explanation
	✖	0.00	This is not the correct dependency graph since activities b and c, and c and d are in parallel, there should be no 'double' connections in the dependency graph.
			
			
			
Total		0.00 / 0.50	

Question Explanation

The footprint of the event log is as follows:

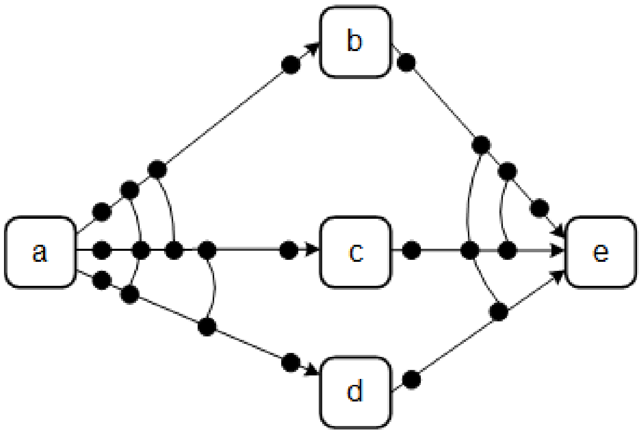
	a	b	c	d	e	f	g
a	#	→	→	#	#	#	#
b	←	#	||	→	#	#	#
c	←	||	#	||	→	#	#

d	#	←	||	#	→	→	#
e	#	#	←	←	#	#	→
f	#	#	#	←	#	#	→
g	#	#	#	#	←	←	#

The dependency graph draws an edge between two activities for each '→' relation as is explained in lecture 3.4: 'Dependency graphs and causal nets'.

Question 5

How many **valid binding sequences** does the following C-Net have?



Your Answer		Score	Explanation
3			
6	✖	0.00	
7			
9			
11			
13			
15			
Total		0.00 / 0.50	

Question Explanation

The Causal net always starts with a and ends with e. In between it allows for the execution of:

- b
- b and c in parallel: < b,c > and < c,b >;
- b, c, and d in parallel: < b,c,d >, < b,d,c>, < c,b,d>, < c,d,b>, < d,b,c> and < d,c,b>.

It therefore allows for 1 + 2 + 6 = 9 traces or valid bindings: < a,b,e >, < a,b,c,e >, < a,c,b,e >, < a,b,c,d,e >, < a,b,d,c,e >, < a,c,b,d,e >, < a,c,d,b,e >, < a,d,c,b,e >, and < a,d,b,c,e >.
Note that for instance that for activity a the output binding of 'c' is not valid since activity e has no corresponding input binding.

Causal nets are explained in more detail in lecture 3.4: 'Dependency graphs and causal nets'.

Question 6

Given the following event log: [< a, e > ^{9}, < a, b, d, e >^{11}, < a, c, e >^{21}, < a, d, b, e >^{4}], which is the correct direct succession matrix?

Your Answer	Score	Explanation

$\vert >_L \vert$	a	b	c	d	e
a	0	0	0	0	0
b	15	0	0	4	0
c	21	0	0	0	0
d	15	15	0	0	0
e	45	15	21	15	0

$\vert >_L \vert$	a	b	c	d	e
a	0	15	21	15	45
b	0	0	0	15	15
c	0	0	0	0	21
d	0	4	0	0	15
e	0	0	0	0	0

$\vert >_L \vert$	a	b	c	d	e
a	0	11	21	4	9
b	0	0	0	11	4
c	0	0	0	0	21
d	0	4	0	0	11
e	0	0	0	0	0

✔ 0.50

This is indeed the correct direct succession matrix, since each cell contains the number of times activity of the row, was directly followed by the activity of the column.

$\vert >_L \vert$	**a**	**b**	**c**	**d**	**e**
a	0	0	0	0	0
b	11	0	0	4	0
c	21	0	0	0	0
d	4	11	0	0	0
e	9	4	21	11	0

$\vert >_L \vert$	**a**	**b**	**c**	**d**	**e**
a	0	21	11	4	9
b	0	0	0	21	4
c	0	0	0	0	11
d	0	4	0	0	21
e	0	0	0	0	0

$\vert >_L \vert$	**a**	**b**	**c**	**d**	**e**
a	0	9	11	4	9
b	0	0	0	11	4
c	0	0	0	0	21
d	0	11	0	0	4
e	0	0	0	0	0

Total 0.50 / 0.50

Question Explanation

In a direct succession matrix each cell contains the number of times an activity (mentioned in the row), was directly followed by another activity (that of the column).

More about how to construct a direct succession matrix is discussed in lecture 3.5: 'Learning dependency graphs',

Question 7

Please consider the following direct succession matrix:

$\mid >_L \mid$	**a**	**b**	**c**	**d**	**e**
a	0	21	11	4	9
b	0	0	0	21	4
c	0	0	0	0	11
d	0	4	0	0	21
e	0	0	0	0	0

Note that this is one of the possible answers of the previous question, not necessarily the right one. In this question we ignore the event log of the previous question and only consider the direct succession matrix as shown above!!!

Which if the following dependency measure matrices is correct, based on the direct succession matrix shown above?

Your Answer		Score	Explanation

○

$\mid \Rightarrow_L \mid$	**a**	**b**	**c**	**d**	**e**
a	0	0.9167	0.9545	0.8000	0.9000
b	-0.9167	0	0	0.4375	0.8000
c	-0.9545	0	0	0	0.9545
d	-0.8000	-0.4375	0	0	0.9167
e	-0.9000	-0.8000	-0.9545	-0.9167	0

◉ ✔ 0.50 This is indeed the correct application of the dependency measure, given the direct succession matrix.

$\mid \Rightarrow_L \mid$	**a**	**b**	**c**	**d**	**e**
a	0	0.9545	0.9167	0.8000	0.9000
b	-0.9545	0	0	0.6538	0.8000
c	-0.9167	0	0	0	0.9167
d	-0.8000	-0.6538	0	0	0.9545
e	-0.9000	-0.8000	-0.9167	-0.9545	0

○

$\mid \Rightarrow_L \mid$	**a**	**b**	**c**	**d**	**e**

a	0	-0.9167	-0.9545	-0.8000	-0.9000
b	0.9167	0	0	-0.4375	-0.8000
c	0.9545	0	0	0	-0.9545
d	0.8000	0.4375	0	0	-0.9167
e	0.9000	0.8000	0.9545	0.9167	0

$\mid \Rightarrow_L \mid$	**a**	**b**	**c**	**d**	**e**
a	0.0	-0.9545	-0.9167	-0.8000	-0.9000
b	0.9545	0.0	0.0	-0.6538	-0.8000
c	0.9167	0.0	0.0	0.0	-0.9167
d	0.8000	0.6538	0.0	0.0	-0.9545
e	0.9000	0.8000	0.9167	0.9545	0.0

Total 0.50 / 0.50

Question Explanation

The dependency measure is calculated as follows:

$|a \Rightarrow_L b|$ is the value of the dependency relation between a and b:

$$|a \Rightarrow_L b| = \begin{cases} \dfrac{|a >_L b| - |b >_L a|}{|a >_L b| + |b >_L a| + 1} & \text{if } a \neq b \\ \dfrac{|a >_L a|}{|a >_L a| + 1} & \text{if } a = b \end{cases}$$

For example, the dependency measure $|a \Rightarrow_L b| = \frac{21-0}{21+0+1} = \frac{21}{22} = 0.9545$ and $|d \Rightarrow_L b| = \frac{4-21}{4+21+1} = \frac{-17}{26} = -0.6538$

More about how to construct the dependency matrix from a direct succession matrix is discussed in lecture 3.5: 'Learning dependency graphs',

Question 8

Given the (partial) traces and the causal net without bindings shown below, which causal net has the correct input and output bindings for activity a if we assume a window size of 5 and no thresholds on when to include a binding?

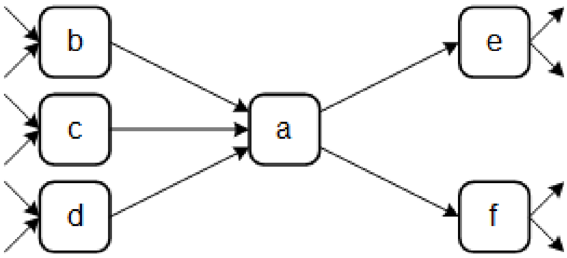
...clbkclm**a**efllknm...

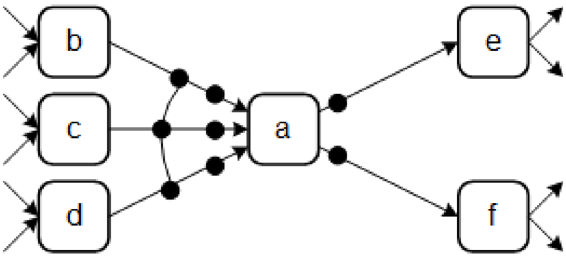
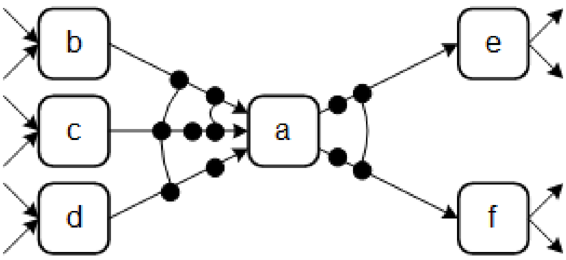
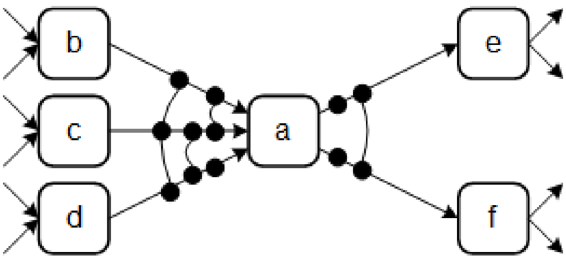
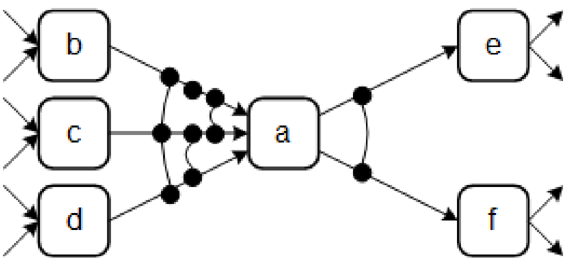
...dmlmdkk**a**felllkm...

...ablcmdl**a**fklmnml...

...dkbclkm**a**filmklk...

...klbcdlk**a**eklmnmf...



Your Answer	Score	Explanation
		
		
	✔ 0.50	This is indeed correct since the input bindings discovered from the traces are: {b,c}, {d}, {c,d} and {b,c,d}
		
Total	0.50 / 0.50	

Question Explanation

More about how to construct the bindings for a causal net is discussed in lecture 3.6: 'Learning causal nets and annotating them',

Question 9

Given the trace below, where ↓ indicates the current position in the trace, which of the following gives the correct abstraction if we apply abstraction with the following settings: **future, multiset, window=6**?

abcdcdcde↓faghhhi

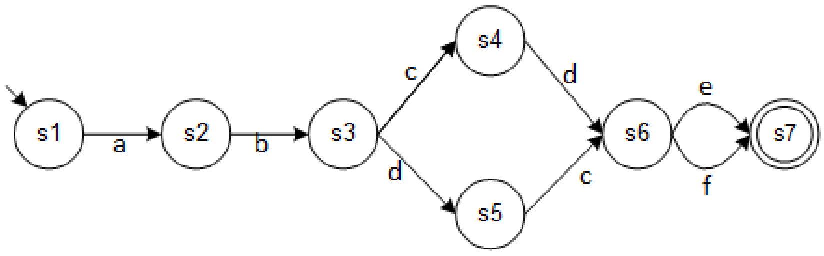
Your Answer		Score	Explanation
$[a, c, d, e, f, g]$			
$< a, f, g, h, h, >$			
$\{a, f, g, h\}$			
$< d, c, d, c, d, e >$			
$[a, f, g, h^3]$	✔	0.50	This is indeed the correct abstraction since it looks at the future, with a window of 6, and creates a multiset abstraction.
$\{a, c, d, e, f, g\}$			
$[d^3, c^2, e]$			
$< a, c, d, e, f, g >$			
$\{d, c, e\}$			
Total		0.50 / 0.50	

Question Explanation

More about learning transition systems, and abstracting from the observed traces, is explained in lecture 3.7: 'Learning transition systems'.

Question 10

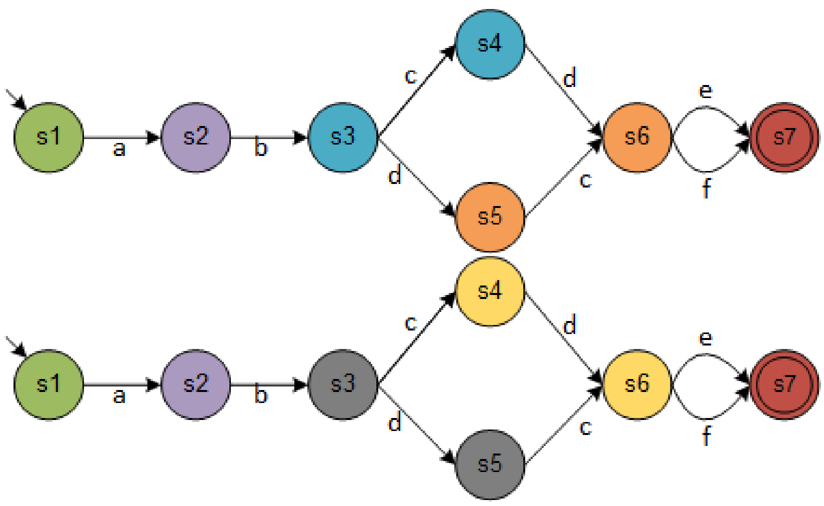
Given the transition system below, which of the shown regions is one of the regions of the transition system that is both **non-trivial** and **minimal**?



Your Answer		Score	Explanation
{s1,s2}			
{s3,s4}			
{s3,s4,s5,s6}	✖	0.00	Although this is a valid region of the transition system (b is entering, c and d are not crossing and e and f are exiting), it is not minimal. This region can be split in several other smaller regions.
{s1,s2,s3,s4,s5,s6,s7}			
Total		0.00 / 0.50	

Question Explanation

All minimal regions are colored in the two transition systems shown below:



Lecture 3.8: 'Using regions to discover concurrency' explains how non-trivial minimal regions are defined on a transition system.