EXAM BUSINESS PROCESS SUPPORT (237400) June 2008

Instructions:

This is an open book exam – it is allowed to consult any reading material provided by the teachers. Be sure to switch mobile phones off and store them in a closed bag. Be sure to indicate name, program and student number on each sheet. The total number of points for the exam is 180. The exam consists of two parts. The first part (120 points!) contains open answer questions and the second part (60 points) consists of twenty multiple-choice questions. Regarding the first part concise yet complete answers are better than long-winded answers.

Success!!

PART I (120 POINTS)

The following case description provides the basis for answering **Questions 1-3**. It describes the steps a person buying a house in the Netherlands must undertake.

How to Buy a House in the Netherlands?

To start with, the buyer wants to buy a house and contacts a Real Estate Agent (REA), which operates in the region of interest. Both the buyer and the REA come up with some minimal requirements that are stored in a so-called "buyer profile" (e.g., price range, type of house, number of rooms, surface of the property, surface of the house, etc.) that the future house must satisfy that can be written in a document for future reference. Once the demands are written, the REA selects a number of houses that comply with these requirements from his database (it can also be an online database, such as funda.nl). This list of houses is created and saved. The buyer may have already selected some houses himself, in which case these houses will be added to the list.

At this point in time it is possible that the buyer may decide to terminate his relationship with the REA because the objects selected by the REA do not satisfy him/her and the REA clearly does not understand buyer's wishes. It can be also possible that the customer will decide to adjust the requirements in order to get a list of houses that better matches his/her preferences. If the buyer considers that the list of selected houses contains objects that are worthwhile further examining, the REA arranges the visits with the owners of those houses and the buyer. This is done in parallel with checking the status of the houses the buyer and the REA are going to visit. This is a just a preliminary superficial check.

After visiting the houses the buyer may again decide to change his requirements and start searching again, completely stop with the current REA or come up with a short list of one or more houses which the buyer would be willing to buy. Upon request from the buyer, a technical expert can be commissioned to examine the houses on the short list and produce a detailed technical report for each. This technical report will include all the details of the house with recommendations and conclusions about the technical state of the house and has to be paid for by the buyer.

Based upon this report and other general information (e.g., manually checking among others funda.nl and the Land Registry - Kadaster database), the REA (or a 3-rd party valuator) estimates the value of the houses on the short list. Based on the results of the technical report and the estimated values, the customer can again decide to change his/her requirements, stop completely or choose a house. In the latter case, the next step is to start the negotiations between the selling REA, buying REA, seller and buyer. The result could be that all parties disagree, which means that the buyer can do one of the following: stop the whole process and discontinue the collaboration with the REA, change his requirements and start all over again, or start the negotiations for the following house in the short list. If the negotiations have been finalized and an agreement has been reached concerning the price, the buyer will have to either pay the house from his own savings or to obtain a mortgage. In the latter case the REA will make a standard report detailing the value of the house. With this report the customer can request a mortgage from a bank. The bank will check the creditworthiness of the requesting person and will issue a mortgage report. If this report is positive (the load will be granted), the bank will establish together with the buyer the conditions of the loan (e.g., amount, interest rate, terms, monthly payments, type of mortgage product, etc.) and will eventually create a mortgage account in which the loaned amount will be deposited.

Furthermore, in the case of a positive mortgage report, the actual property transfer can be set up and a contract is signed in the presence of a notary. Based on this contract, the bank will subsequently transfer the amount covering the price of the house in the account of the seller. The buyer must also pay some taxes, a fee for the notary and the commission for the REA (so called "buyer costs – k.k."). These payments may be covered again either from own savings or from the mortgage account.

Note: For this exercise you are required to use the BiZZdesign notation and draw several models. Applying the modelling best practices suggested in the lectures is also part of the grade for this exercise.

Question 1 (15 points):

Identify all actors involved in the process of buying a house and draw a model of them in which you also indicate what kind of items (e.g., money, products, services, information) they exchange.

Question 2 (15 points):

Model the process a buyer must follow in order to become the owner of a new house.

Question 3 (30 points):

Take now the perspective of the buying REA. His objective is to buy as many houses as possible as fast as possible. The following questions refer to the process of buying a house from the buying REA perspective.

Question 3-a (5 points)

Once a new house is offered for sale on the market, the REA has two options: to check in their house searchers data base which clients could be interested in that house (according to their profile), notify them about the house and invite them to make an appointment for visitation. The second option is to collect all the newly available houses on the market in last two weeks, produce aggregated lists of houses and send them to all potentially interested house searchers in the data base. Which of the two strategies mentioned above is in your opinion more efficient in terms of completion time and in terms of costs involved. Motivate why?

Question 3-b (15 points)

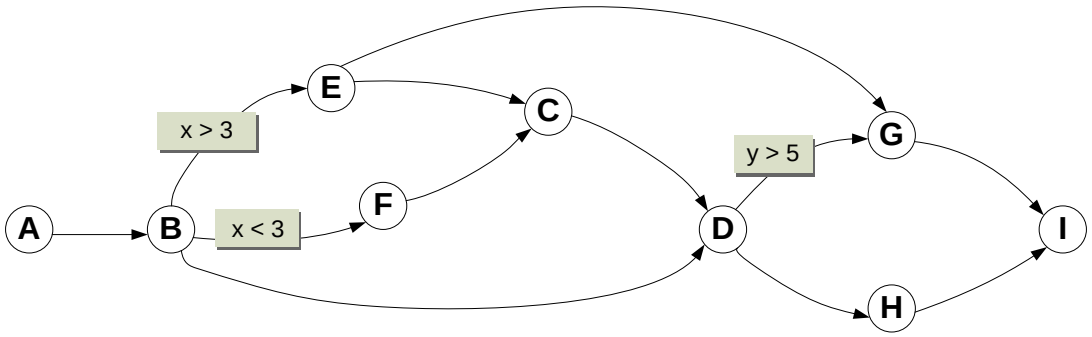
Model the process of finding a house for a buying customer, from the perspective of the buying REA. Choose one of these two options described above (at Q. 3-a) and model all the activities the buying REA fulfils for finding a suitable house for one of the REA's customers. Remember that the REA must find suitable houses for its customers, arrange the technical expertise, evaluate the house and arrange visitations. Compare this process with the process you designed for question 2. What are the main differences what is the overlap?

Question 3-c (10 points)

How can you transform the process you designed at Q. 3-b such that the REA can complete his part of a transaction as fast as possible?

Question 4 (24 points)

Consider the following Activity Net S and assume that all activities have join semantics `AT_LEAST_ONE`:



Let *ActStates* bet the set of possible execution states of a single workflow activity:

ActStates:= {*not_activated*, *activated*, *running*, *completed*, *skipped*}

Remark:
An activity is *activated* if it has been enabled (i.e., its execution can be started). An activity is in state *running* if it has already been started, but not yet been *completed*. Activities which can no longer be executed due to a deadpath elimination are *skipped*.

Question 4.a (4 points)
Which activities will have been always executed for completed workflow instances on S independent from the concrete execution paths taken? Explain your anwer!

Question 4.b (12 points)
Let I_1, I_2, and I_3 be three workflow instances running on S and having the following execution logs (i.e., audit trails):

Execution log of workflow instance I_1:

START(A)	END(A)	START(B)	END(B)[x=4]

Execution log of workflow instance I_2:

START(A)	END(A)	START(B)	END(B) [x=3]

Execution log of workflow instance I_3:

…	START(D)	END(D)[y=2]	START(G)	START(H)

For each of the instances I_1 – I_3 specifiy the current state of their activities; i.e., assign to each of the activities A - I its corresponding execution state *state(X)* ∈ *ActStates*. Use one table per instance to structure your answer.

Question 4.c (4 points)

How can a data flow from C to D be modeled in the given Activity Net. Explain your answer!

Question 1.d (4 points)

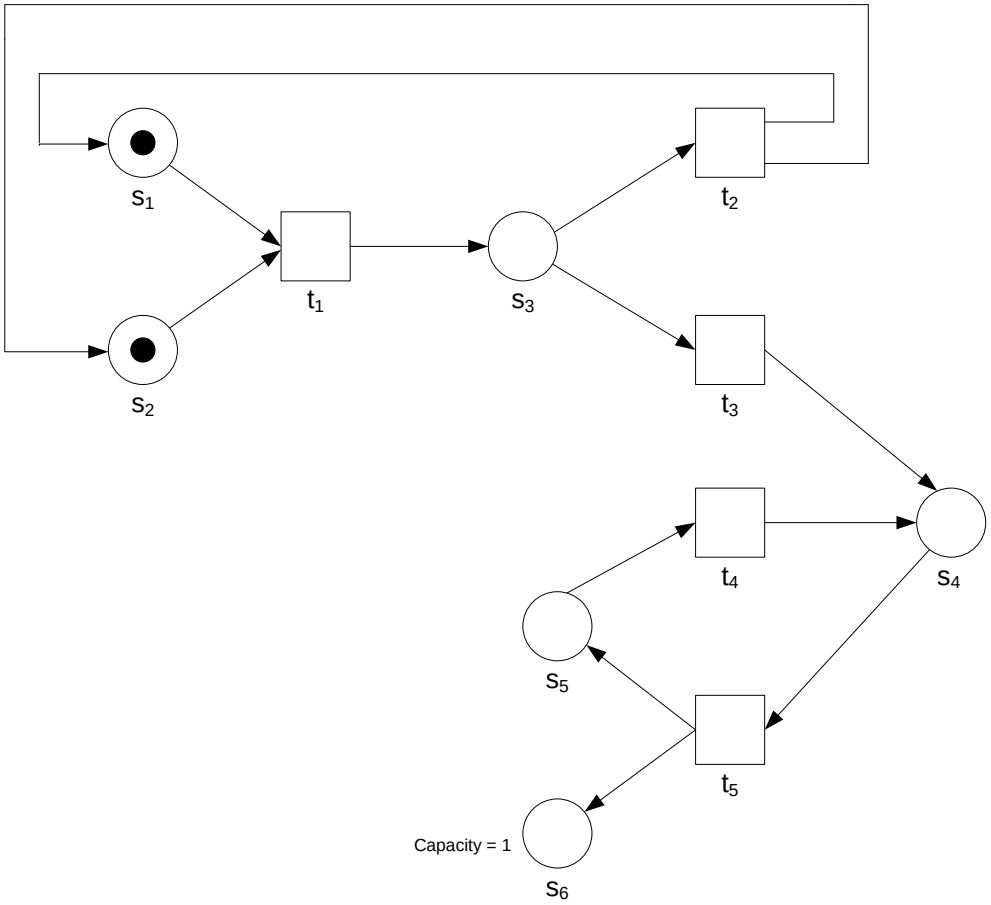
Which of the following structural changes of activity net S will not result in correct activity net S' afterwards. Explain your answer!

a) Deletion of the transition B → E.

b) Deletion of the transition B → D
c) Insertion of the transition F → D.
d) Insertion of the transition I → D.

Question 5 (24 points)

Consider the following Petri Net:



Question 5.a (10 points)
Perform a *reachability analysis* for this Petri net; i.e., determine the set of all reachable states! Use a table to structure your answer!

Please note that place s_6 has capacity 1!

Question 5.b (4 points)
Draw the *reachability graph* for this Petri net!

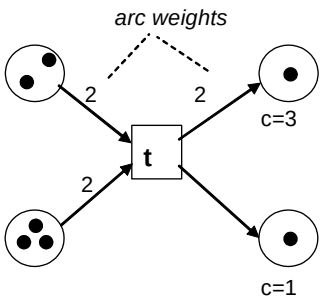
Question 5.c (6points)
Does this Petri Net contain a deadlock? Give an explanation for your answer!

Question 5.d (4 points)
Assume that the capacity for place s_6 is changed from 1 to ∞. How would this net change affect the set of reachable states?

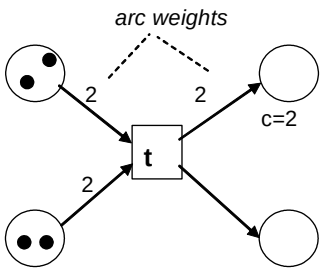
Question 6 (12 points)

We consider the following three Petri Nets (places have unlimited capacity *c* except there is an an explicit value specified):

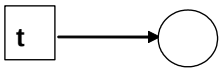
a)



b)



c)



For each of these three Petri nets give a statement whether transition *t* can fire under the current marking or not. Explain your answers!

For cases where transition t can fire, additionally, draw the Petri net with the marking resulting afterwards.

PART II. MULTIPLE CHOICE QUESTIONS (60 POINTS)

For each of the following 20 questions you can reach 3 points!

Question 1

Which of the following aspects does not characterise the TQM approach for process improvement?

a. Reduction of the development cycles
b. Continuous improvement
c. Significant redesign of business processes
d. Measurement of the process performance
e. Bottom-up management of the change process

Question 2

In which way is Business Process Management (BPM) different from Business Process Re-engineering (BPR)?

a. Because BPM also identifies the individual tasks that make up a process.
b. The scope of BPM projects is usually broader.
c. A BPR process also assumes fundamental changes in the organisational cultures which take a lot of time and are costly, while BPM does not.
d. BPM assumes the existence of a process execution environment which is integrated with a specification environment.

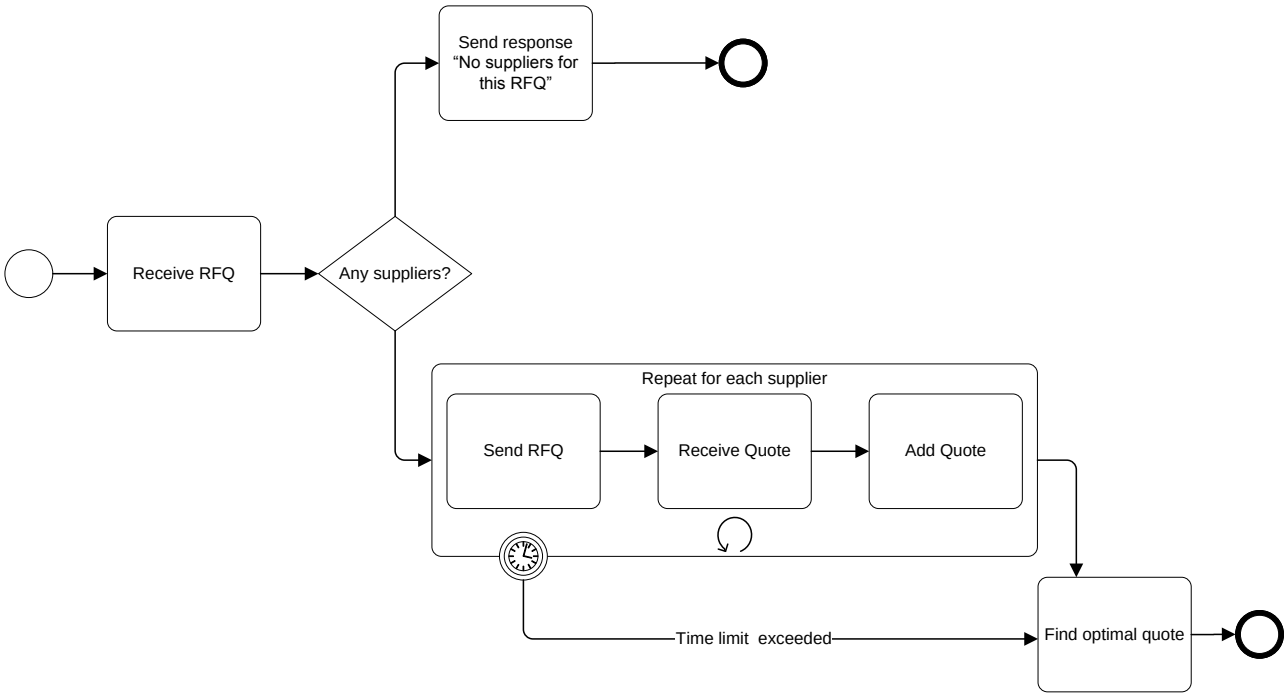
Question 3

Which one of the following statements is true?

a. TQM facilitate the modelling, management, and monitoring of business processes.
b. In a BPR the business logic and the application logic are separated.
c. In a BPR business rules may be used to orchestrate application services that support automated activities in the process.
d. BPR is aiming to radical process quality improvement.

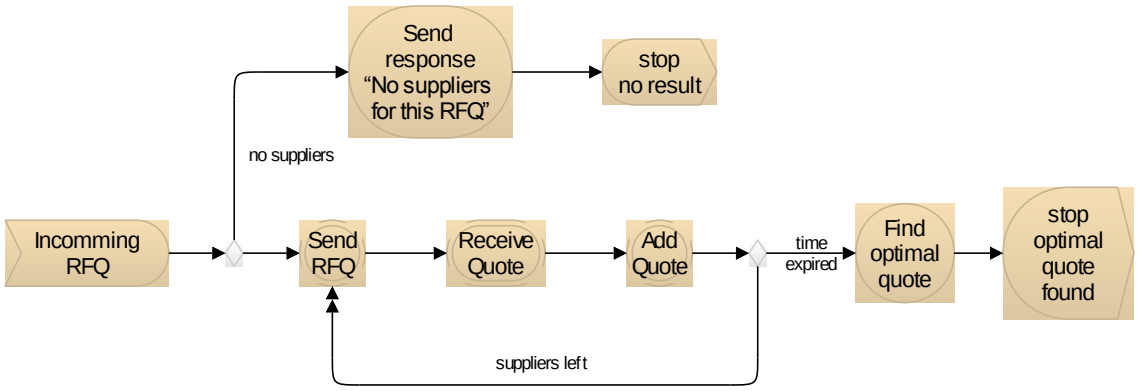
Question 4

Let us consider the "Request For Quote" process model, modelled in BPMN and depicted below.

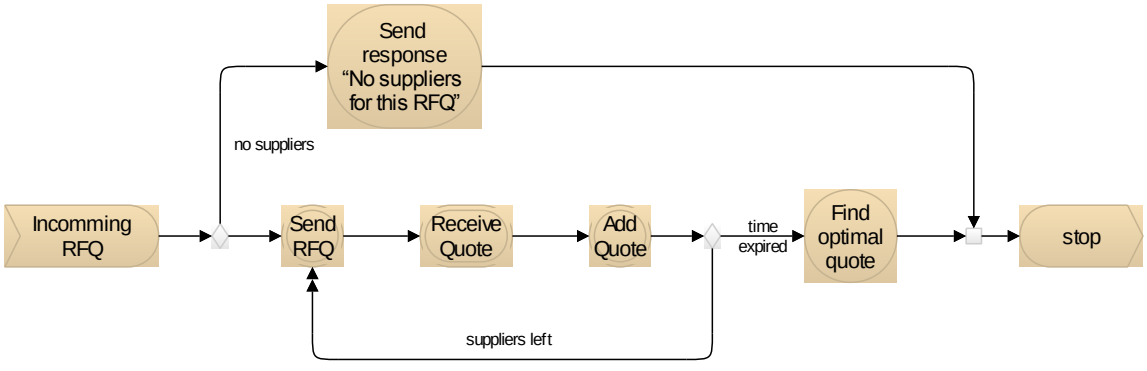


Which of the BiZZdesigner models, given below, models correctly the same process?

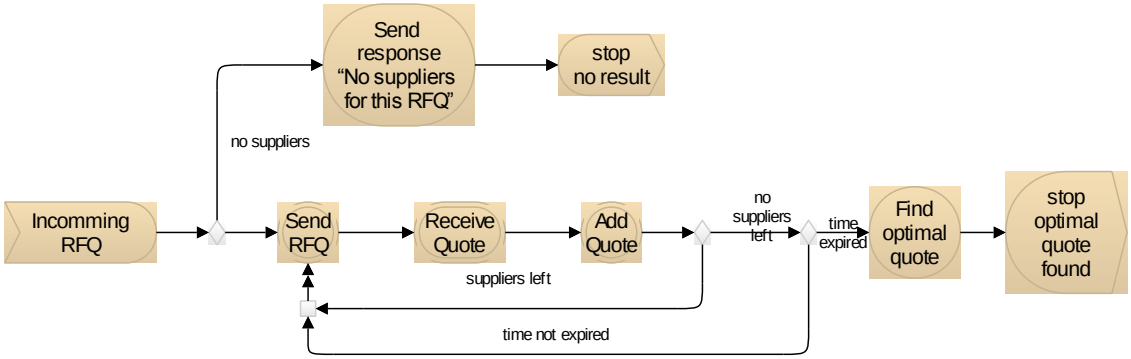
a.



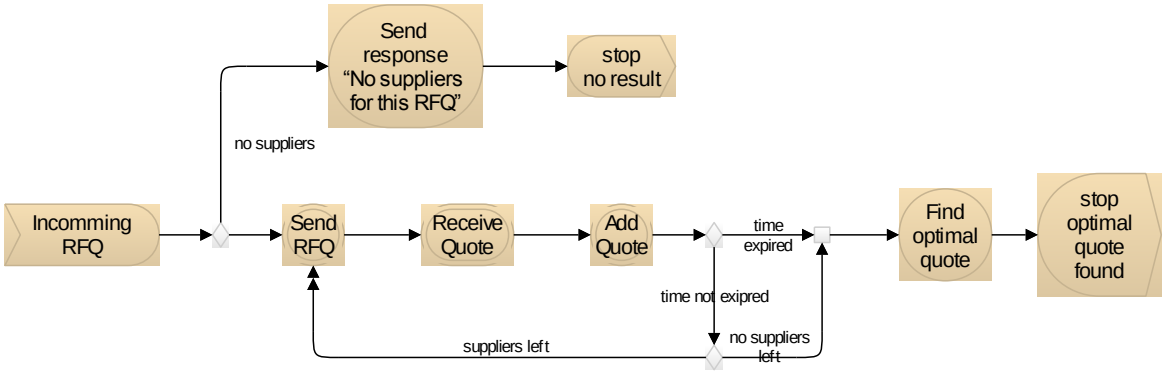
b.



c.



d.



e. None of the above.

Question 5

Which of the concepts mentioned below can not be found in the BiZZdesigner modelling notation?

a. actor
b. interaction
c. event
d. process loops
e. all of the above are included in the BiZZdesigner notation

Question 6

As you may recall a complete business process modelling technique should be capable of representing the following "process perspectives":

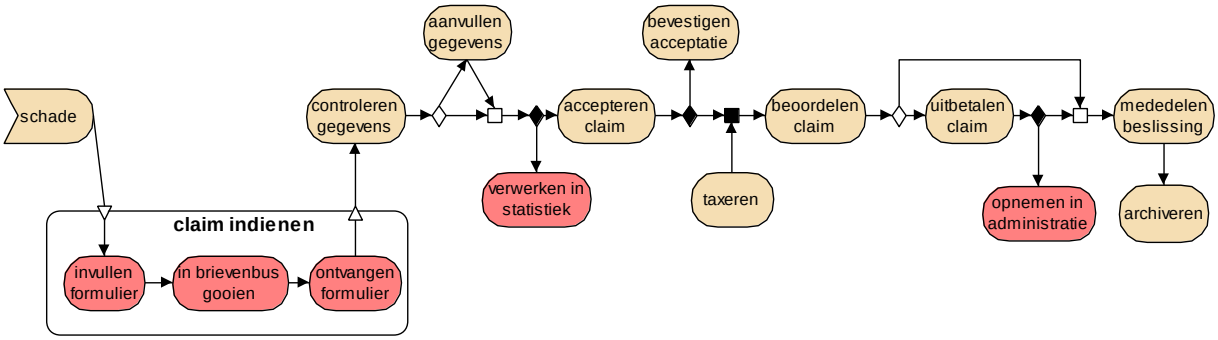
- The *functional* perspective.
- The *organizational* perspective.
- The *informational* perspective.
- The *behavioural* perspective.

Which of the following statements is true?

a. The behavioural perspective is covered by Event Process Chains in the BPMN notation
b. The functional perspective in covered in BiZZdesigner by actor diagrams
c. UML activity diagrams can be used to model the informational perspective
d. The organisational perspective in BPMN is fully covered by swim-lanes.

Question 7

Which of the following statements is true:



a. The model follows the best practice of showing the process flow from left to right.
b. The model is incorrect because the process never ends.
c. The model is incorrect because it contains different levels of detail which is against the modelling best practices.
d. The model is incorrect because activities have been coloured differently.
e. None of the above is true.

Question 8

Which of the following statements is not true:
Carrying out a critical path analysis may help you to

a. Discover the bottlenecks in a process;
b. Determine the duration of a process;
c. Determine the critical success factors in a reengineering project;
d. Determine the critical activities in a process;
e. Determine the possible areas of improvement in a process.

Question 9

COPAFIJTH can not be used to:

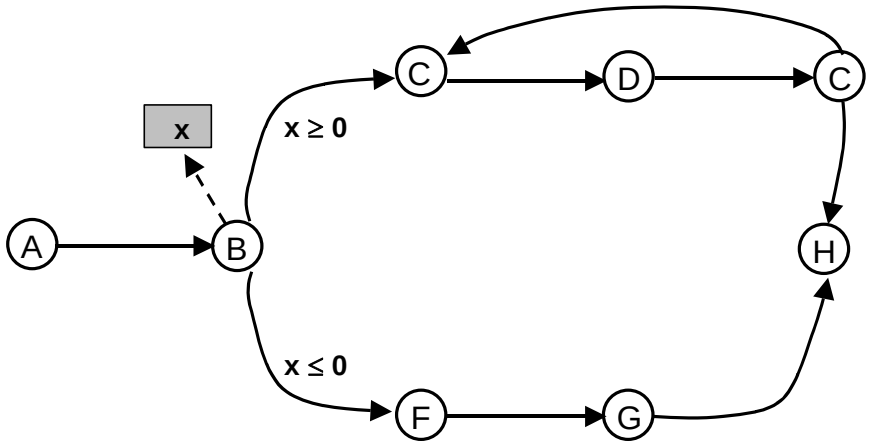
a. Determine the scope of the reengineering project
b. Determine the goal of the reengineering project
c. Identify modelling flaws in the reengineering project.
d. Clarify relationships between bottlenecks and critical success factors and norms.

Question 10

Which of the following statements is not true:
Common goals of the redesign phase are:

a. Removing bottlenecks in processes
b. Improving other performance indicators
c. Implementing new products and services
d. Carrying out impact-of-change and risk analyses.
e. Aligning processes with new developments
f. Automating process activities using new technologies

For the following two questions consider workflow schema S (modelled in terms of an Activity Net):



Question 11.

Workflow instances running on schema S will …

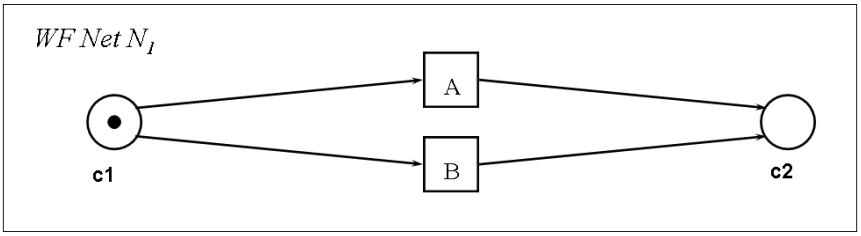
a) always run into a deadlock.
b) never run into a deadlock.
c) only run into a deadlock if x > 0 holds (when completing B)
d) only run into a deadlock if x = 0 holds (when completing B)

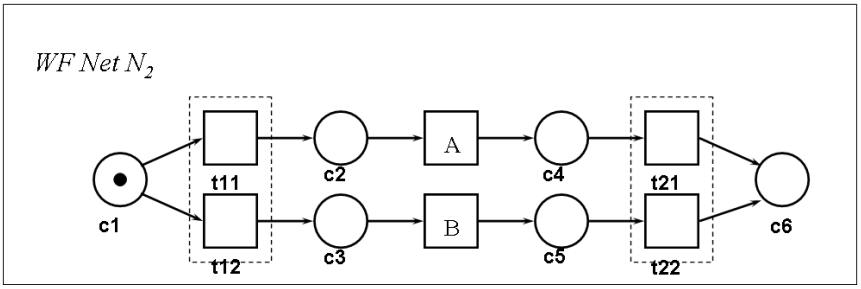
Question 12.

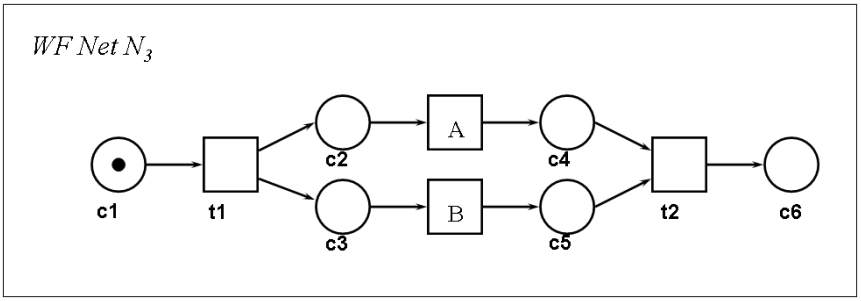
Which activities will be <u>always</u> completed for an instance running on S:

a) activities A, B, and H
b) activity A
c) activities A and B
d) activities A, B, C, and H

For the next three questions consider the following Workflow Nets $N_1 - N_3$:







Question 13.

Which of the following statements is true?

a) In net N_1, activities A and B may be concurrently executed (i.e., be worked on in parallel)!
b) In net N_2 activities A and B may be concurrently executed!
c) In net N_3 activities A and B may be concurrently executed!
d) In none of the three nets, activities A and B may be concurrently executed.

Question 14.

Consider the workflow net N_2. Which of the following statements is true?

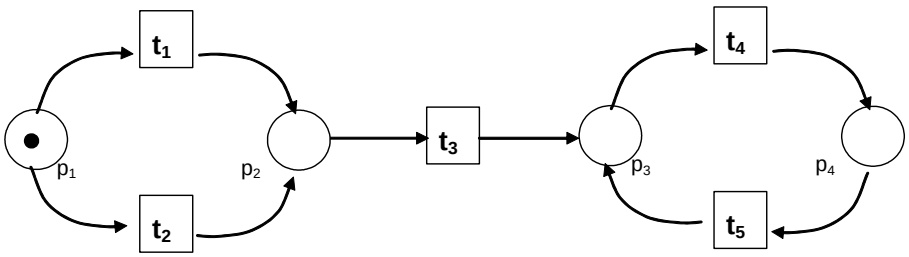
a) In the initial marking of N_2, only Activity t11 is enabled.
b) In the initial marking of N_2, only Activity t12 is enabled.
c) In the initial marking of N_2, both Activity t11 and Activity t12 are enabled.
d) In the initial marking of N_2, neither Activity t11 nore Activity t12 are enabled.

Question 15.

Consider the workflow net N_3. Which of the following statements is true?

a) In each reachable state at most one place contains a token.
b) In each reachable state at least one place contains a token.
c) In each reachable state exactly one place contains a token.
d) In each reachable state exactly two places contain a token.

For the next question consider the following Petri Net!



Question 16.

Which of the following statements is <u>not true</u>?

a) Transition t_1 can fire at most once?
b) Transition t_2 can fire at most once?
c) Transition t_3 can fire at most once?
d) Transition t_4 can fire at most once?

Question 17.

Consider the worklist handler component of a workflow management system? Which of the following statements is <u>not</u> true?

a) For a particular workflow instance I at most one work item exists at a certain point in time.
b) For a particular workflow instance I multiple work items related to the same workflow activity may exist at a certain point in time.
c) For a particular workflow instance I no work item may exist at a certain point in time.
d) For a particular workflow instance I multiple work items related to different workflow activities may exist at a certain point in time.

Question 18.

Consider the workflow reference model as suggested by the WfMC. Which of the following statements is not correct?

a) The workflow reference model provides interfaces which allow workflow enactment services to interact with each other.
b) The workflow reference model provides interfaces for implementing worklist applications.
c) The workflow reference model provides interfaces for accessing audit trails.
d) The workflow reference model provides interfaces for the migration of workflow instances to a new workflow model version.

Question 19

Which of the following items does <u>not</u> constitute a runtime task of a workflow management system:

a. Maintaining an audit file or log for workflow enactment
b. Creating and starting new workflow instances
c. Monitoring the progress of ongoing workflow instances
d. Checking a workflow model for the absence of deadlocks

Question 20

Which of the following kind of data is usually not generated and maintained by a workflow management system?

a. process audit data
b. process relevant data
c. control data
d. application data