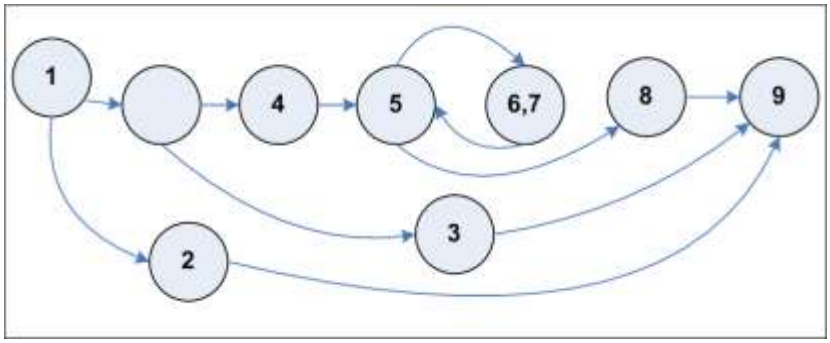
Practise questions

Look at the following flow chart and corresponding source code. Use these to answers questions 1 to 3.




```
int factorial(int x) {
        if (x<0) {                                  // 1
                throw new BadArgumentException();   // 2
        }
        if (x==0) {
                return(1);                          // 3
        }
        int result=1;                               // 4
        while (x!=1) {                              // 5
                result=result*x;                    // 6
                result--;                           // 7
        }
        return(result);                             // 8
}                                                   // 9
```

Q1. What is the minimum number of tests required to test every piece of this code?

a) 3
b) 4
c) 5
d) 6
e) 7

Q2. Given the following test suite

(X=-20)

(X==1)

Which nodes are not covered by this suite?

a) (2),(3)
b) (3),(6,7)
c) (2),(6,7)
d) (2)
e) (2),(3),(6,7)

Q3 Which of the following is untrue about blackbox testing?

a) It often uses testing partitions to determine appropriate test coverage.
b) Each path in program is guaranteed to be executed at least once
c) The source code is not known by the tester
d) Test data values are often set to the edge of partition boundaries
e) The tests are according to the system specification

Q4 Look at the following fragment specification "The method will accept a date in the form of 3 variables, a day of month, a month of year and a year. The month is set to 1 for January, 2 for February etc.". Given that the month=2 and year=2014, which of the following day settings would test all boundaries for the method.

a) 1, 28
b) 1,28,29
c) 0,1,28,29
d) 0,1,28,29,30
e) 0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28

Q5. Look at the description of a fire alarm given in Appendix A, which of the following describes the possible Actors of the system?

a) Bank staff, security guards, engineer
b) Smoke sensors, security sensors, heat sensors
c) Bank staff, security guards, security sensors, heat sensors, smoke detectors
d) Bank staff, security guards, security sensors, heat sensors, smoke detectors, police, fire brigade
e) Police, fire brigade

Q6 What would be the role of the use case "Fire confirmed"

a) Included as part of “Detect heat”, “Detect Smoke” use cases
b) Extended from "Detect heat", "Detect Smoke" and included from "Fire button pressed"
c) Extended from “Detect heat”, “Detect Smoke”, “Fire button pressed” use cases
d) Included as part of“Detect heat”, “Detect Smoke”, “Fire button pressed” use cases
e) None of the above

“An organisation is using the Bell–LaPadula security model to control their communications and controlling all their communications. They have a bulletin board which all staff can post messages on to. Given that Alice has top clearance (level 4), Bob has middle clearance (level 2), Karen (level 1) and Derek has low level clearance (level 0). Bob posts a message inviting all staff to a BBQ. Answer questions 7 and 8, assuming all staff who receive a message, reply to it on the bulletin board by the end of the working day.

Q7 What messages would Karen (level 1) staff be able to read from the board at the end of the day (when everyone would have replied).

a) No messages
b) Messages from Alice and Bob only
c) Messages from Alice, Bob and Derek only
d) Messages from Alice, Bob, Derek and Karen only
e) Messages from

Q8 What messages would Bob be able to read at the end of the day?

a) No messages
b) Only his own only
c) Alice and his own messages only
d) His own message’s and Karen and Derek
e) No messages

Q9 Assuming everyone wants to go to the BBQ, who will be there?

a) Everyone only
b) No one only
c) Alice and Bob only
d) Alice, Bob and Derek only
e) Bob only

Q10 What is authentication?

a) Checking messages have not been altered
b) Keeping messages secret
c) Keeping messages with a timestamp
d) Verifying the identity of a user of the system
e) Controlling access rights to data

Q11 Why is partition testing useful?

a) It helps to ensure that all paths are tested.
b) It covers every single value that a test data item can be
c) It helps to uncover incorrect use of comparator operators such as less than and less than or equals.
d) It helps to stress the system
e) None of the above

Q12 Which of the following is not true about petri-nets?

i) They are deterministic
ii) They can be used to model systems with finite state
iii) Places can fill up, so no more tokens can enter
iv) A transition is always enabled if all its incoming places contain a token

a) i) and iii) and iv)
b) ii) and iv)
c) ii) only
d) all of the above
e) none of the above

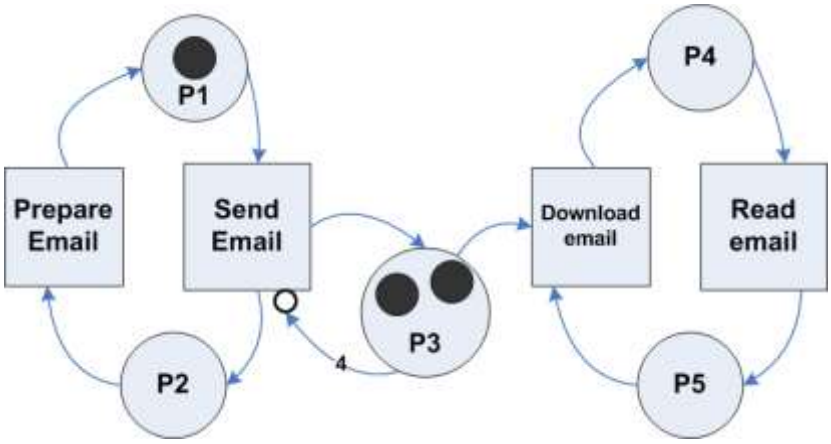


Figure 1 Petri Net

Q13 Looking at the model of the petri-net shown in Figure 1, showing an email sending system. What transitions will be enabled if the Send Email transition fires?

a) Prepare Email, download email only
b) Prepare Email only
c) Prepare Email and send email only
d) Deadlock (no states) only
e) Send email and read email only

Q14 Starting at the state given in Figure 1, what transitions will be enabled after the following sequence, send Email, prepare Email?

a) Prepare Email, download email only
b) Prepare Email only
c) Prepare Email and send email only
d) Deadlock (no states) only
e) Send email only

Q15 Starting at the state given in Figure 1, what transitions will be enabled after the following sequence, send Email, prepare Email, send Email, prepare Email?

a) Prepare Email, download email only
b) Prepare Email only
c) Prepare Email and send email only
d) Deadlock (no states) only
e) Send email only

Q16 What do the tokens in P3 represent?

a) Messages written but not sent
b) Messages sent but not downloaded
c) Messages downloaded but not read
d) Maximum messages that can be sent
e) Sender of email

Q17 What is the maximum number of messages can be transit?

a) 1
b) 2
c) 3
d) 4
e) 5

Q18 What is the maximum number of states that the net can achieve?

a) 1
b) 2
c) 4
d) 6
e) Infinite (no max)

Q19 What is wrong with the configuration of the net?

a) Nothing
b) There should be no connection between P3 and send Email
c) There is a token missing from the right hand
d) There should be no token in P1
e) P1 should contain 2 tokens

Q20 What do tokens in P2 represent?

a) Editors of email
b) Readers of email
c) Email messages yet to be sent
d) Email messages yet to be read
e) None of the above

21 Which of the following are **NOT** verifiable requirements?

X1: Product high cohesion
X2: Server response delay has an average of 200ms
X3: Software is easy to use
X4: Software is written in Java

- ☐ **(A)** X1 and X2
- ☐ **(B)** X1, X2 and X3
- ☐ **(C)** All of the above
- ☐ **(D)** X2 and X4
- ☐ **(E)** X1 and X3

22 Which of the following techniques are suitable for cost estimation of a new project where comparable software has not been produced, and there are no available experts in the project application domain?

X1 Algorithmic cost modelling
X2: Parkinson's Law
X3: Pricing to win
X4 Expert judgement
X5 Estimation by analogy

- ☐ **(A)** X1 and X2
- ☐ **(B)** X2 and X5
- ☐ **(C)** X3 and X4
- ☐ **(D)** X2 and X4
- ☐ **(E)** X2 and X3

23 What does the following describe : “The project costs expand to consume whatever resources are available”?

- ☐ **(A)** Expert judgement
- ☐ **(B)** Parkinson’s law
- ☐ **(C)** Estimation by analogy
- ☐ **(D)** Simulation
- ☐ **(E)** Validation estimation

24 Which of the following is a process in the waterfall software lifecycle?

- ☐ **(A)** Risk analysis
- ☐ **(B)** Prototyping
- ☐ **(C)** Iteration
- ☐ **(D)** Integration and system testing
- ☐ **(E)** Spiralling

Appendix A

Proposed combined security and fire system

An international bank has contracted your company to develop a software system to monitor and control a fire and security system in its new building. The building is divided into seven distinct zones and each zone contains several smoke detectors (which detect the presence of smoke), several heat detectors, fire alarm buttons (which a person can push if they detect a fire) and security sensors (which detect the presence of people in the zone and can trigger an alarm when outside normal banking hours or during holidays for example). Through interviews with bank personnel and an initial proposal, it has been determined that the following factors of the new system should be taken into account: A password may be entered by bank staff when entering/leaving a zone outside normal hours which will activate/deactivate the security system for the zone (i.e., once a zone is deactivated, the police won't be called if the security sensors detect movement so that staff can work out-of-hours). Each member of staff is allocated a number of zones that they are permitted to work in after hours. When a smoke detector detects smoke, or excess heat it will send a message to the software system to report it. All building alarms should then be sounded. The fire brigade should be automatically contacted *once a fire is confirmed* (since it may be a false alarm). The bank specified that a fire should be called "confirmed" if either two sensors detect smoke or heat, or else *any* fire alarm button has been pushed. To reset the alarm a bank security guard can reset the system and all alarms in the event of a false alarm after checking the particular zone. To do this function a dual key mechanism is used, that is two security guards are required to reset the alarm. For some zones there are sprinkler systems which can be activated automatically or by a security guard *if a fire is confirmed and no one is in that zone*. The security subsystem can automatically call the police and lock all internal doors to isolate zones and avoid intruders being able to move freely within the building if movement is detected out-of-hours (you should consider the possibility of BOTH an intruder being detected and a fire confirmed at the same time; ALL internal doors should obviously be unlocked in this case.) The security guard can periodically test the system so that any malfunctions can be rectified.