

SQ test

SQ lab 4

Q1

In the system maintenance, changes into software are introduced in the operational environment, then software is tested.

1. This introduces additional risks
2. Should not do this way
3. This is OK
4. Do not know if it is OK

Q2

In the system maintenance, changes into software are introduced in the operational environment, then software is tested. System is the main communication channel used by 100,000+ clients 24/7. Claims:

Q3

1. Agile methods are flexible, process frameworks are non flexible
2. Agile methods concern development, process framework - many processes
3. AM are not compatible with PF
4. AM are compatible with PF

Q4

plan driven process

1. reqs are well understood
2. plan driven tools are available
3. strict deadlines and costs
4. when the customer is less cooperative

Q5

2. Use incremental process ...: which are preferred (ANS)

1. With frequent changes
2. with flexible deadlines and costs
3. with public sector projects
4. when the customer is cooperative
5. with certain types of customers and/or projects, eg related to end-user experience

lab 5

TDD

is it necessary to use TDD in small projects? NO

if TDD improves code maintainability? YES

when refactoring is big like deleting some tests and changing the some functionalities of the working program. in this case it is not maintainable.

Quiz

Software (product): what are we buying when buying „software“?

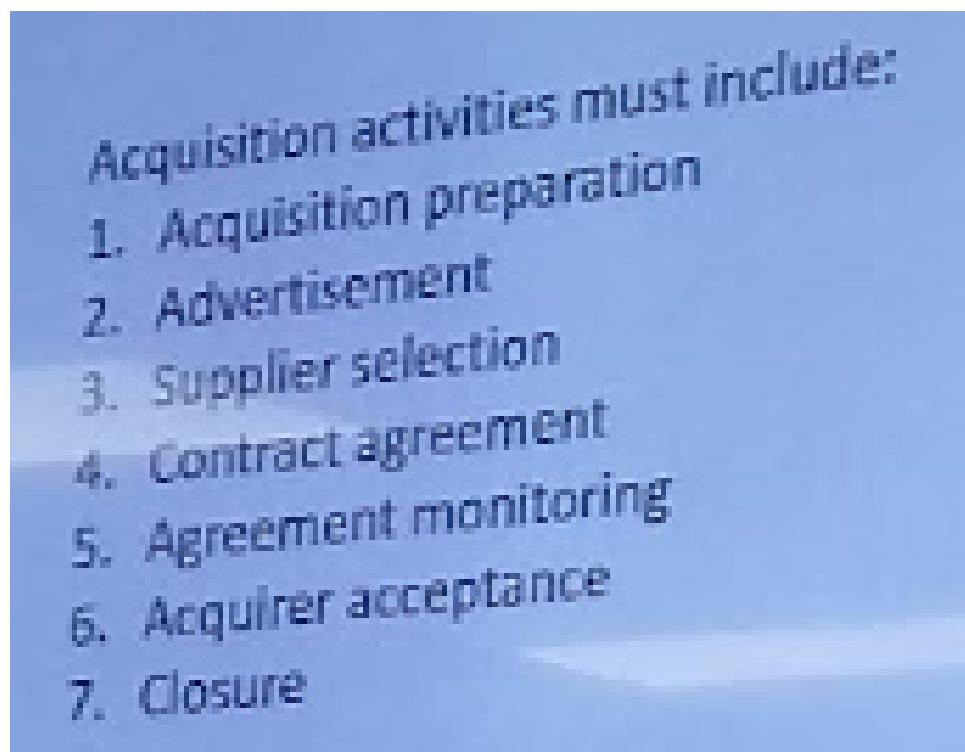
Set of computer programs, procedures, and possibly associated documentation and data ... there may be more

- acquired IT-resources (incl source code, object code, executable code, macros, etc)... target and non-target software
- procedures (user, software, organization), data, project documentation
- property rights: for working, for development, for distribution, ...
- changes in customer organization, in work organization, ... ,
- methodology, development tools, resources
- knowledge

Q1. software product may comprise (включать)

1. source and executable code
2. documentation
3. license
4. all above

Q2. All is correct



acquisition activities may include

1. acquisition prep
2. advertisement
3. supplier selection
4. contract aggrement
5. agreement monitoring
6. acquirer acceptance
7. closure

Acquisition activities

- Acquisition preparation (incl describing a concept or a need to acquire, system requirements, software requirements, acquisition plan, processes, options)
- Advertisement (communicating the request for supply to selected suppliers)
- Supplier selection (based on criteria identified in the request for supply)
- Contract agreement (incl rights, change control)
- Agreement monitoring (using other processes)
- Acquirer acceptance (incl acceptance strategy and criteria, validation and verification, test cases, acceptance testing, configuration management)
- Closure (incl payments and conclusion of the agreement)

a requirements change management for banking transactions software must involve:

1. documenting all requirements and requirements changes that are given to or generated by the project
2. maintaining a requirements change history, including the rationale changes
3. evaluating the impact of requirements changes from the standpoint of relevant stakeholders
4. make requirements and change data available to the project

Q3. 1, 2, 3, 4

A requirements change management for a banking transactions software must involve:

1. Documenting all requirements and requirements changes that are given to or generated by the project
2. Maintaining a requirements change history, including the rationale for changes
3. Evaluating the impact of requirement changes from the standpoint of relevant stakeholders
4. Make requirements and change data available to the project

Q4. which statement best describes Scrum?

1. a complete methodology that defines how to develop software
2. a cookbook that defines best practices for software dev
3. a defined and predictive process that fits in with traditional management approaches
4. a framework with built-in reality checks for complex work in uncertain domains

Q5. 1, 4

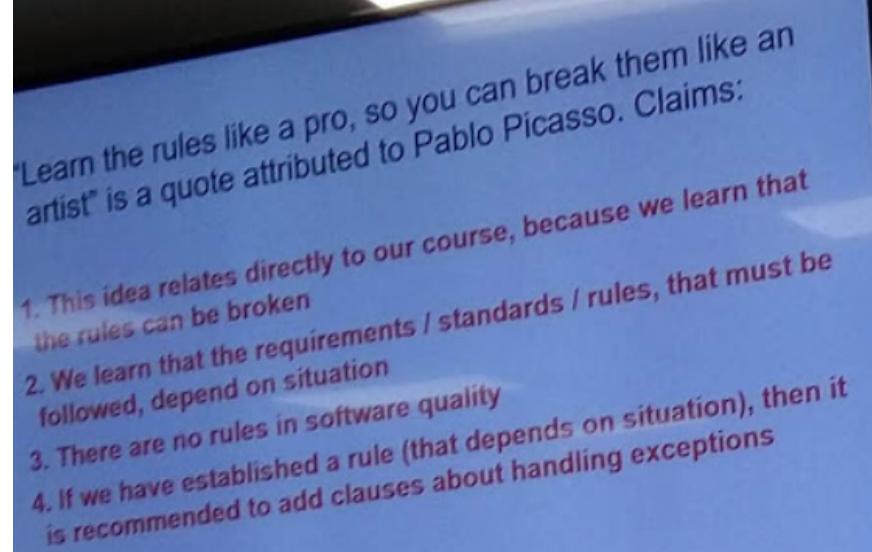
- Which of the following is least correct?
- A. Acquisition Validation demonstrates that an acquired product or service fulfils its intended use when placed in its intended environment
 - B. Acquisition Validation includes establishing the Validation Environment
 - C. Acquisition Validation includes code review for adherence to best practices
 - D. Acquisition Verification ensures that selected work products meet their specified requirements

Q6. 1, 4

In the system maintenance, changes into software are introduced in established and documented process involving three environments (development, testing, and operational environment); automated testing, release management; etc. Claims:

- 1. This reduces risks
- 2. This is the correct way to software quality
- 3. Should not be done in this way
- 4. Do not know if this is OK

Q7. 2, 4



lec 6

can testing there are no errors in the program? **no** it cannot.

does every error result in failure? **no**. it can be a simple error that does not effect a lot to system.

when to finish testing? **we don't know exactly**. because we don't know how many errors are remaining.

who are the testers?

white box testing

we should take inputs and outputs from the specs. it would be more broad. if taken from the program it won't be precise.

how many tests are needed to cover the system statement coverage(pic1)? **one** test can be enough.

- 1 Function max (a,b)
- 2 Read a,b
- 3 max := a
- 4 If b>max
- 5 Then max := b
- 6 End If
- 7 End Function

how many test for this? at least 3

```

class Ship:
    def __init__(self, name):
        self.name = name

    def cv(self):
        raise NotImplementedError("Subclass must implement abstract method")

class Submarine(Ship):
    def cv(self):
        return 'It is so yellow'

class Steamboat(Ship):
    def cv(self):
        return 'Coming and going, splashing the night away'

```

(pic 3) 6 different cases in this pic. so at least 6 is required.

```

Public Function GetStatusCode(status As Long) As String
Dim msg As String
Select Case status
Case IP_SUCCESS: msg = "ip success"
Case IP_BUF_TOO_SMALL: msg = "ip buf too small"
Case IP_DEST_NET_UNREACHABLE: msg = "ip dest net unreachable"
Case IP_DEST_HOST_UNREACHABLE: msg = "ip dest host unreachable"
Case IP_DEST_PROT_UNREACHABLE: msg = "ip dest protocol unreachable"
Case IP_DEST_PORT_UNREACHABLE: msg = "ip dest port unreachable"
End Select

```

pic 3

in this case system coverage is not kind of achievable.

```

$number_three = 3;

if ( $number_three == 3 ) {
echo "The if statement evaluated to true";
} else {
echo "The if statement evaluated to false";
}

```

pic 4

(pic 5)not possible in this case because we never achieve the result.

```

...
goto next
x := 56
...
...
if (age>=20 and age <=50)
  then begin No:= No+1;
  if (age>= 51) then print "OK"
...
...
print "Input four numbers"; read x,y,z,a;
B:=0;
if (int (x)=x and int (y)=y and int (z)=z and int (a)=a and
    x>0 and y>0 and z>0 and a>2 and x**a+y**a=z**a)
then B:=1
...

```

pic 5

summary of system coverage criterion.

....

dis... if there is a condition then branch testing

....

Branch Coverage

there are different numbers of branch and system coverage.

(pic7) 7 tests for branch coverage

```
Public Function GetStatusCode(status As Long) As String  
  
Dim msg As String  
  
Select Case status  
    Case IP_SUCCESS: msg = "ip success"  
    Case IP_BUF_TOO_SMALL: msg = "ip buf too_small"  
    Case IP_DEST_NET_UNREACHABLE: msg = "ip dest net unreachable"  
    Case IP_DEST_HOST_UNREACHABLE: msg = "ip dest host unreachable"  
    Case IP_DEST_PROT_UNREACHABLE: msg = "ip dest protocol unreachable"  
    Case IP_DEST_PORT_UNREACHABLE: msg = "ip dest port unreachable"  
  
End Select
```

pic7

(p8) will this test provide branch coverage? we have two derived classes. we **don't** have branch coverage here.

```
class Ship:  
    def __init__(self, name):  
        self.name = name  
  
    def cv(self):  
        raise NotImplementedError("Subclass must implement abstract method")  
  
class Submarine(Ship):  
    def cv(self):  
        return 'It is so yellow'  
  
class Steamboat(Ship):  
    def cv(self):  
        return 'Coming and going, splashing the night away'  
  
ships = [Steamboat('Orleans'), Submarine('Hydronaut'), Steamboat('Comet')]  
  
for ship in ships:  
    print(ship.name + ': ' + ship.cv())
```

p8

how many branch and statement coverage test(p9)?

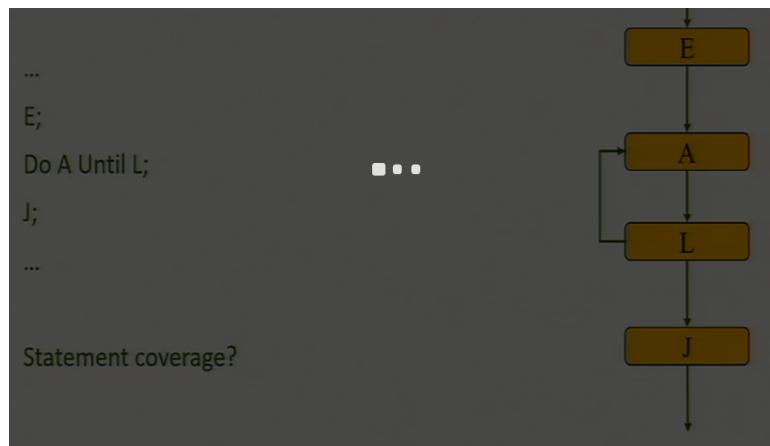
```

Dim UserInput As String
UserInput = "not ok"
Do Until UserInput = "ok"
    UserInput = InputBox("Please Enter Secret Word")
Loop

```

p9

how many branch and statement?

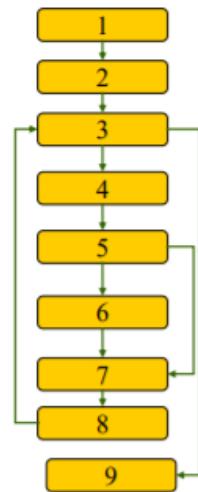


how many items needed for the branch coverage? p10. 2 items is sufficient.
ex: age between 20 and 25 is ok. and second is out of range number smaller than 20 and bigger 25. so answ is 2. in here there are sub conditions. if we go deeper ex: if age is more than 20 we still need to check if it is smaller than 20.

```

1 Function Select (P)
2   I := 1;
3   While not end-of-file (P)
4     Begin
5       If (P(I, age)>20 And P(I, age) < 25)
          Or (P(I, education)= "high"
6       Then Print P(I, name);
7       I:= I+1;
8     End While;
9   End Function

```



p10

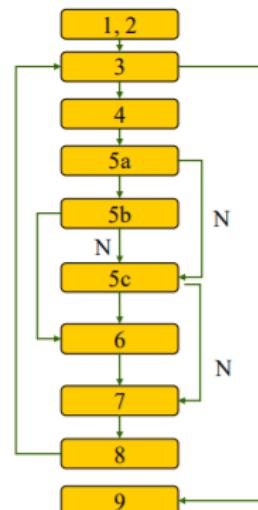
how many items needed for branch coverage(p11)? to cover this we need 5a and 5b to be true...

Multiple condition coverage

```

1 Function Select (P)
2   I := 1;
3   While not end-of-file (P)
4     Begin
5abc   If (P(I, age)>20 And P(I, age) < 25)
          Or (P(I, education)= "high"
6     Then Print P(I, name);
7     I:= I+1;
8   End While;
9 End Function

```

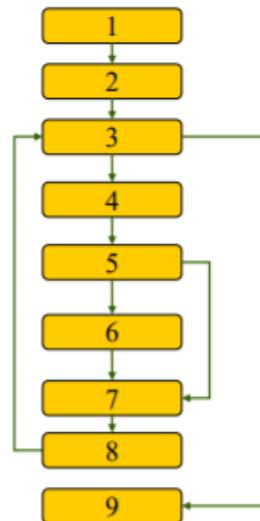


p11

(p12) just one item. one element, two paths; if there are two elements how many possible paths? 5 paths.

Path coverage if max 1000 records?

```
1 Function Max (price)
2   Max := price(1); I := 2;
3   While not end-of-file (price)
4     Begin
5       If price(I)>Max
6         Then Max := price(I);
7         I:= I+1;
8     End While
9 End Function
```



p12

statement coverage is the weakest

branch coverage is medium (very good)

path coverage is the best.

Data Coverage

for nested loops we don't need to check all the combinations.

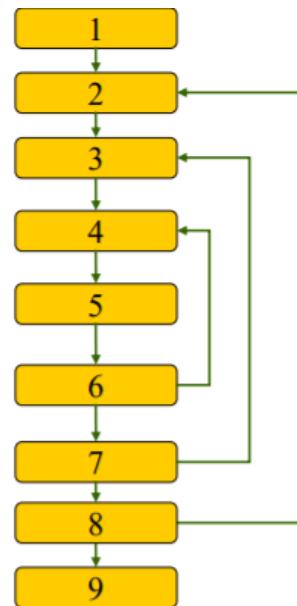
(p13) how many tests are needed? can we answer by looking at the program text? no we can't. but we can say how many branch coverage tests are needed. can we say what tests are needed for br cov? we need req-s for testing. for based on program text we can't answer this question. we need program specs.

- “How many tests are needed to test this program?”
- “How many tests are needed to test this program by branch coverage?”
- “What are the branch coverage tests?”

Nested loops

Instead of all combinations of simple loop test values:

- All test values on each level together with middle values on the other levels
- (Test all equivalence classes and boundary values, but not all their combinations)



p13

how is white box testing used in SD?

- it can be integrated to coding
- it can be separated
- most of the time done parallel with coding.

white box vs black box.

lab 6

P06

Class	IDY0204
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Type	Practical

EARLY QUIZ

Given Claims:

1. TDD is needed for automated testing
2. Automated testing is needed for TDD
3. Automated testing can be used in RUP
4. TDD cannot be used in RUP

Which is the best answer?

Which one is not a phase in RUP?

1. Inception phase
2. Elaboration phase
3. Transition phase
4. Deployment phase

Does Scrum have a role called "project manager"

No

Which item is not included in the agile manifesto?

- Responding to change
- Working software

- Iterative development
- Customer collaboration

Which of the following is the most correct?

- Agile dev method can not be used together with ISO 9001

Statement, branch, path coverage?

```
Public Function Min3 (a As Variant, b as Variant, c As Variant)
As Variant
    Min3 - Find minimum
    Min3 = a
    If b < Min3 then
        Min3 = b
    End if
    If c < Min3 then
        Min3 = c
    End if
End Function
```

Function Save(e-mail): Statement, Branch, Coverage?

```
Function Save( e-mail)

if Trip() then send_response(email,trip)
end if

if attach() then send
end if

if (topic="SQaS") OR (Sender="TR") then
    transfer
else if (topic="ES") then transfer
else tranfer
end if

END FUNCTION
```

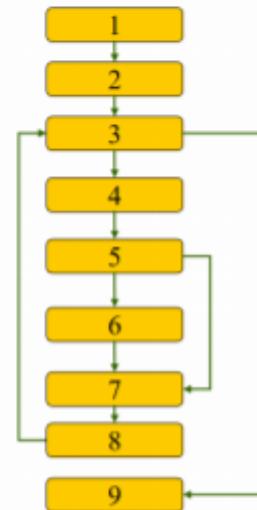
at least 3 tests

3 branches

Q:

Path coverage if max 1000 records?

```
1 Function Max (price)
2   Max := price(1); I := 2;
3   While not end-of-file (price)
4     Begin
5       If price(I)>Max
6         Then Max := price(I);
7         I := I+1;
8     End While
9 End Function
```



A:

??

Presentation from student

Good and Bad Quality Code

lec 7

internet was designed for US military as a weapon.

what software architect(SA) do? he is a technical person. it is about changing organization. 75% time spent for defining problem 25% for solving it. main thing:

software architecture is the practice of keeping complexity under control.

tools: 1. simple text(most simple one) 2. UML diagrams are the best to show the system 3. feedbacks ...

patterns avoid re-implementation and re-invention of same things. but which patterns to use?

sequence model in UML is the most approachable (just the best to use).

security

it must be built from the first day. it is about removing functionality. like there is an API without authentication then it can break the business process. extra functionality causes disadvantages most of the time.

data model and storage

CAP (consistency, availability, partition tolerance) theorem. in distributed data system you can chose to have one of this.

testability

is an important property of system architecture. for testing: selenium...

lab 7

Q1. how many test for statement coverage? 2 how many branch coverage tests: 2. Aswer B

Number of tests in a statement coverage test suite and branch coverage test suite is different in case of:

- A. Assignment expression
- B. if-then statement (without else)
- C. if-then-else statement
- D. Arithmetic operator

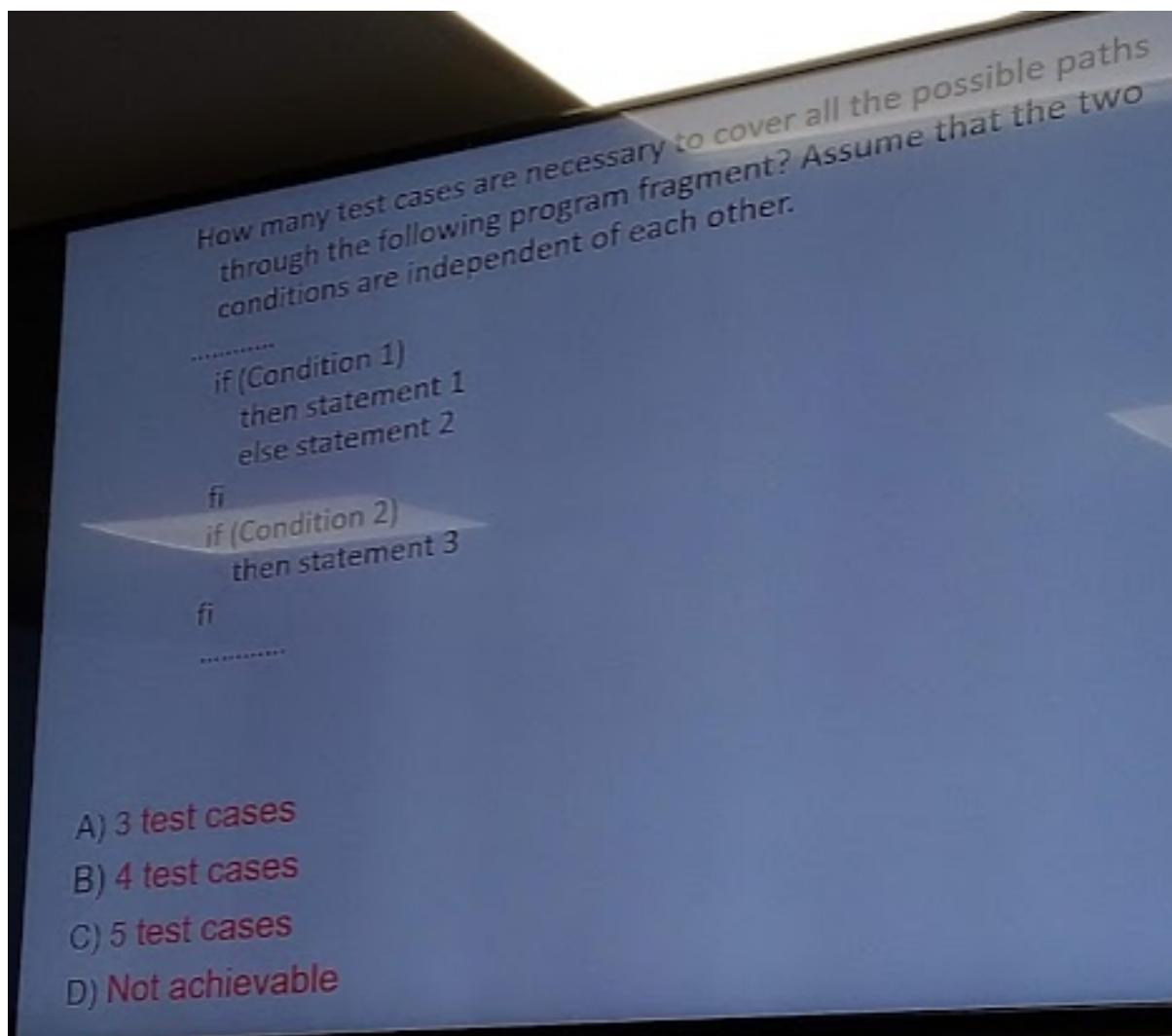
q2. how many branches : 3

How many tests for this fragment:

- A. Statement coverage - 3 tests
- B. Branch coverage - 3 tests
- C. Statement coverage - 4 tests
- D. Branch coverage - 4 tests

```
public class IfExample {  
    .....  
    if(i > 100)  
        System.out.println("i is  
greater than 100");  
    else if(i > 50)  
        System.out.println("i is  
greater than 50");  
    }  
}
```

q3. ans 4 tests



q4. how much time for path coverage? ans B

It is possible to perform 1000 test/sec. How long does it take to test path coverage (max 1000 values in file "kaalud")?

- A. <1 sec
- B. >=1 sec and < 1 day
- C. >= 1 day and < 1 year
- D. Until next Big Bang

Function Max (kaalud)

```
Max := kaalud (1); I := 2;  
While not end-of-file (kaalud)  
Begin  
  If kaalud (I)>Max  
    Then Max := kaalud (I);  
  I:= I+1;  
End While  
End Function
```

q5. for statement coverage: 1. branch and path coverage 1. because no branches. we don't have specs so we cant design anything. ans D

Task: Perform white box testing based on coverage criteria

```
public class CalculateRectArea {  
  public static void main(String[] args) {  
    ...  
    int area = length * width;  
    System.out.println("Area of a rectangle is " + area);  
  }  
}
```

Which of these statements is not true?

- A.One test is needed for statement coverage
- B.Equal number of tests is needed for statement, branch and path coverage
- C.The following is a test that enables branch coverage: Input: 3, 5; Output: "Area of rectangle is 15"
- D.Based on available information, we can design test(s) needed for coverage

architectural patterns

there are levels of arch patterns. this discussion will discuss mid-level pattern.

layered architecture.

lec 8 lab 8

static analysis.

errors are discovered at the early state. reqs have to be testable, functional or non-f.

static analysis tools: questionnaires, standards, analysis for security vulnerabilities, analysis of degradation ... we can also add tools for other artefacts (design ...).

Eg. naming variables, classes etc. easy thing but hard to implement.

most obvious kind of tool: PEP 257.

Q1. ans: C because repo is used.

To turn on heating remotely, house owners use an app to store the required temperature values in cloud. The heater controllers periodically check the temperature values in the cloud and control the heaters respectively. This might be best described as:

- A. The Model-View-Controller (MVC) pattern
- B. The Layered architecture pattern
- C. The Repository pattern
- D. Client-server architecture
- E. Pipe and filter architecture

Q2. ans: E because pipe and filter is directly just like sending sms.

To turn on/off heating remotely, a house owner sends SMS to the house heating controller, using a dedicated SIM card. This might best be described as:

- A. The Model-View-Controller (MVC) pattern
- B. The Layered architecture pattern
- C. The Repository pattern
- D. Client-server architecture
- E. Pipe and filter architecture

Q3 ans E

Motivations for explicit architecture include:

1. Stakeholder communication
2. System analysis and design
3. System documentation
4. System understanding
5. System reuse

Select the best combination of correct answers:

- A) 1,2,3,5 only
- B) 1,3,4 only
- C) 2,5 only
- D) 1,2,3,4,5

Q4: ans 1

A typical software system architecture mostly deals with the following TCP/IP Model Layers:

1. Application Layer
2. Transport Layer
3. Internet Layer
4. Link / Network Interface Layer

Select the best combination of correct answers:

- A)1,2,3,4 only
- B)2,4 only
- C)1 only
- D)1, 3 only

ans B

True or false? Static methods, eg walkthroughs, are useful because:

- 1.They can replace very expensive tests
- 2.They are easier to arrange than tests
- 3.Developers like them
- 4.They find errors early

Select the right combination of correct answers:

- A)1 only
- B)1 and 4 only
- C)1 and 2 only
- D)1,2,3,4

ans c

Ariane 5 error could be found by:

- 1.Specification walkthrough
- 2.Code walkthrough
- 3.White-box testing
- 4.System testing

Select the right combination of correct answers:

- A)1 and 2 only
- B)2 and 4 only
- C)2,3, and 4 only
- D)1,2,3,4

ans c

Participants have been sent the walkthrough time, room and topic. Which activity is not needed?

- A) Send the materials for the walkthrough
- B) Introduce the walkthrough arrangement if not done already
- C) Inform the participants about the amount of bonus for successful walkthrough
- D) Determine the roles in the walkthrough

ans c

Participation of the boss in a walkthrough:

1. Is useful because this helps to limit unnecessary discussions
2. Is useful because the boss receives feedback about the team member's ability
3. Is useful when the boss participates as team member in the substantive work of the project
4. Is generally undesirable

Select the right combination of correct answers:

- A. 2 and 4 only
- B. 1 and 4 only
- C. 3 and 4 only
- D. 1,3,4 only

q3(metrics). **a**

Metrics: summary duration of unplanned outages
in a week. The best value?

- A. < 1 sec
- B. 1 sec ... 1 min
- C. 1 min... 1 h
- D. >1 h

q4(best reason). **c**

What is the best reason to use source line count as a metric?

- A. All people understand it in the same way
- B. It can be used to promote programmers
- C. It can be used for software development cost prognosis
- D. Number of source lines for the same task remains constant in years to come

q5(not good main-ce). C

Which of these is not a good maintenance metric?

- A. Percentage of a system uptime
- B. Time required to understand usage of the system
- C. Time required to fulfil a service request
- D. Time required to reinstate a service after a major failure

Q2: B

Economic reasons for low quality software may be:

1. Metcalfe's law: the value of a network is proportional to the square of the number of users of the system
 2. Often large costs to users from switching technologies, which leads to user lock-in
 3. In a market in which there is asymmetric information with respect to quality, the bad may drive out the good
 4. Quality means different things to different users - it is difficult to find a product that would be suitable for everyone
- A. 1 only
B. 1,2, 3, and 4 only
C. 2,4 only
D. 2,3,4 only

Q3: 1

Which of these certifications is the most used in Estonian software companies?

1. ISO 9001
2. CMMI
3. ISO 27001
4. ISO 14001

Q4: testing is just one activity among many so not only one, 2nd is also less so ans is C

Which of the following can be recommended as a target for ISO 9000 series standard implementation?

- A. Program testing only
- B. Program testing and certification only
- C. Certification and process improvement only
- D. Certification only

Q5: 9003 is for software process, 9001 does not certify anybody(d) so ans is B

Which of the following is the most correct?

- A. ISO 9001 is a software processes standard
- B. Certification to ISO 9001 has the best value for an organisation when quality management is the major goal
- C. Certification to ISO 9001 has the best value for an organisation when verification, testing, and validation is the major goal
- D. ISO certifies companies with respect to ISO 9001