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YEAR 12 *Trial Exam Paper*

2018

COMPUTING: SOFTWARE DEVELOPMENT
Written examination

STUDENT NAME:

Reading time: 15 minutes
Writing time: 2 hours

QUESTION AND ANSWER BOOK

Structure of book

Section	*Number of questions*	*Number of questions to be answered*	*Number of marks*
A	20	20	20
B	6	6	20
C	15	15	60
			Total 100

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers and one scientific calculator.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or correction fluid/tape.

Materials provided
- Question and answer book of 27 pages
- Insert containing a case study for Section C in the centrefold
- Answer sheet for multiple-choice questions

Instructions
- Remove the insert from the centre of this book during reading time.
- Write your **name** in the space provided above and on the multiple-choice answer sheet.
- All written responses must be in English.

At the end of the examination
- Place the answer sheet for multiple-choice questions inside the front cover of this book.
- You may keep the insert.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination.

SECTION A – Multiple-choice questions

Instructions for Section A

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.

Choose the response that is **correct** or that **best answers** the question.

A correct answer scores 1; an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

Question 1

Mary has created file-sharing software that will allow users to share files with each other. The software is installed on networked computers. Each computer can send and receive files or portions of files to another computer without needing a central server to handle the file transfer.

The style of application architecture of the file-sharing software is most likely

A. rich client.

B. peer-to-peer.

C. client-server.

D. service oriented.

Question 2

Roly is a systems analyst for a local bank.

To evaluate the efficiency of a new software solution for processing financial transactions, he should

A. check that the financial data is accurate before and after the transaction.

B. have five people participate in usability testing and provide feedback.

C. track the number of errors in the system over a three-month period.

D. measure the time taken to process financial transactions.

Question 3

Maya is creating a new website that will process credit card payments for customer orders. She wants to use the most up-to-date security measures on her website to make sure all customer financial information is kept secure.

The most appropriate security protocol that Maya should use in her website is

A. TCP/IP security.

B. Secure Sockets Layer.

C. HTTP Security Protocol.

D. Transport Layer Security.

Question 4

Daniela is the lead programmer working on creating an automotive application that handles job bookings for car services. She has just finished deciding the naming conventions her team will use when writing the software.

Deciding naming conventions typically occurs in which stage of the problem-solving methodology?

A. design

B. analysis

C. evaluation

D. development

Use the following information to answer Questions 5–7.

```
Algorithm Alpha(a)
Begin
    If length(a) < 2 Then
        Return a
    EndIf

    left ← the first half of a
    right ← the second half of a
    newLeft ← Alpha(left)
    newRight ← Alpha(right)

    Return Beta(newLeft, newRight)
End

Algorithm Beta(a, b)
Begin
    c ← []
    While a is not empty and b is not empty Do
        If a[0] < b[0] Then
            c ← c + a[0]
            remove a[0] from a
        Else
            c ← c + b[0]
            remove b[0] from b
        EndIf
    EndWhile

    If a is empty Then
        c ← c + b
    Else
        c ← c + a
    EndIf

    Return c
End
```

Question 5

In the pseudocode, both `Alpha` and `Beta` are best described as implementations of

A. methods.

B. functions.

C. procedures.

D. instructions.

Question 6

In the pseudocode, the data structure that best describes `a`, `b` and `c` is

A. array.

B. record.

C. hash table.

D. dictionary.

Question 7

After the pseudocode has been implemented, the data below is passed to algorithm `Alpha`.

```
a ← [banana, apple, durian, mango, apricot, pear]
```

What will be returned by the algorithm?

A. `[apple, banana, durian, apricot, mango, pear]`
B. `[apple, apricot, banana, durian, mango, pear]`
C. `[apple, apricot, banana], [durian, mango, pear]`
D. `[apple, banana, durian], [apricot, mango, pear]`

Use the following information to answer Questions 8 and 9.

Andrea has just started a new project with a client. She has created the Gantt chart below to represent the first stage of her project when the software requirements specification (SRS) is being created.

Task no.	Task name	Duration	Start	Finish	Predecessors
1	interview client	1 day	Mon 05/02/18	Mon 05/02/18	
2	construct software requirements specification (SRS)	9 days	Tue 06/02/18	Fri 16/02/18	1
3	– document solution constraints	1 day	Tue 06/02/18	Tue 06/02/18	
4	– document scope	1 day	Wed 07/02/18	Wed 07/02/18	3
5	– document _____	7 days	Thu 08/02/18	Fri 16/02/18	4
6	– _____	0 days	Fri 16/02/18	Fri 16/02/18	2
7	meet with client for feedback	1 day	Mon 19/02/18	Mon 19/02/18	6
8	make changes based on client feedback	3 days	Tue 20/02/18	Thu 22/02/18	7
9	submit final SRS to client	0 days	Thu 22/02/18	Thu 22/02/18	8

Question 8

The complete task name of task 5, with seven days duration, is most likely

A. document data dictionary.

B. document evaluation criteria.

C. document functional requirements.

D. document user interface requirements.

Question 9

The complete task name of task 6, with no days duration, is most likely

A. create SRS.

B. proofread SRS.

C. submit SRS for feedback.

D. call client to set up meeting.

Question 10

Sandra needs to sort a very large data set that she has been given by her teacher. The data is already sorted, but Sandra does not know this.

The sorting algorithm that will produce the best result for Sandra in terms of sort time is

A. quick.

B. linear.

C. binary.

D. selection.

Question 11

A South Australian clinic that provides health services to clients has experienced a series of break-ins where equipment was stolen. Peter, the office receptionist, believes that the thief is a patient at the clinic, as all of the equipment taken was being used to treat one particular medical condition. Peter wants to download all of the information on patients who have that condition so that he can give this information to a private investigator to track down the thief. He asks his manager, Sarah, for permission but she tells him that he cannot because it is against legislation.

Which legislation is Sarah most likely referring to?

A. *Charter of Human Rights and Responsibilities Act 2006*

B. *Privacy and Data Protection Act 2014*

C. *Privacy Act 1988*

D. *Spam Act 2003*

Question 12

Charlie has been approached by Juanita to write new software for her real estate business. Juanita employs six real estate agents who mostly work away from the office. She wants them to have secure access to information about all of the houses available for sale and rent on a mobile application that they can use while they are out of the office. The real estate agents use their own phones of varying makes, models and operating systems.

To obtain information to help Charlie write the software requirements specification (SRS), the most efficient action for him to take is to

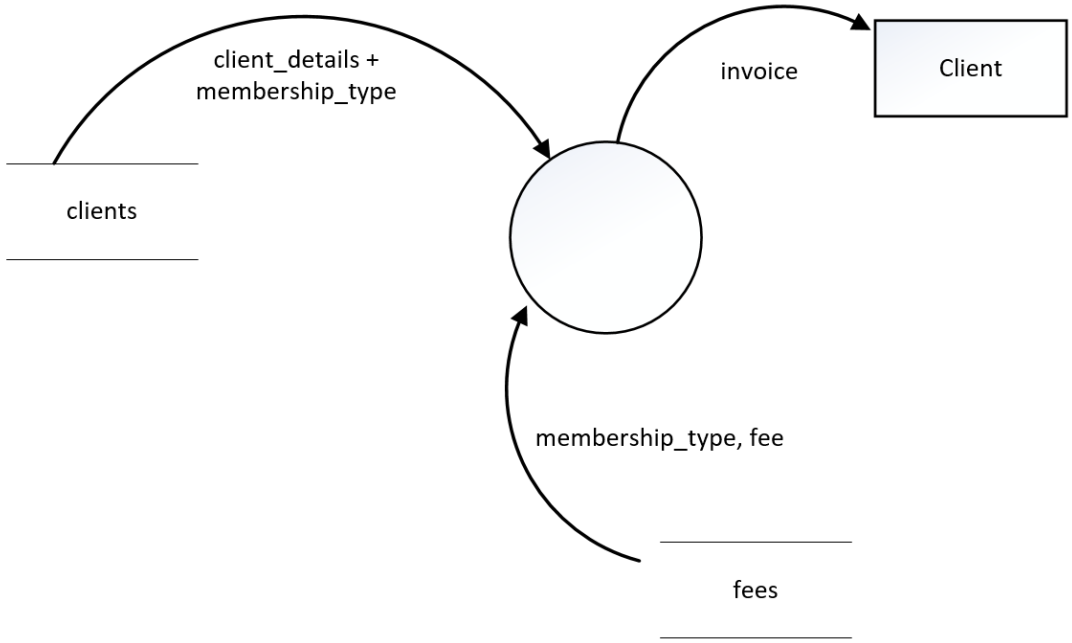
A. send a questionnaire to all the agents.

B. interview a random selection of agents.

C. spend a day at the business to observe how it runs.

D. observe how real estate data is entered into the current system.

Question 13



Which statement best represents what is shown in the data flow diagram above?

A. A client requests a membership and is sent an invoice for the membership fee.

B. Two processes send data to a data store that then creates an invoice for a client.

C. Two data stores send data to a process that then creates an invoice for a client.

D. A client process sends a request to retrieve client details and fees from data stores to create an invoice.

Question 14

A program is being written that will perform calculations based on daily temperatures of a small lake.

The most efficient and effective variable name that the programmer could select to store the temperature taken from the lake is

A. lakeT.

B. lTemp.

C. lakeTemp.

D. lake_temperature.

Use the following information to answer Questions 15 and 16.

Jani has just exported the data from a messaging application on her phone. Some of the exported data is shown below.

```
1   <?xml version='1.0' encoding='utf-8'?>
2   <messages>
3       <note status="read">
4           <to>Danica</to>
5           <from>Jani</from>
6           <heading>Reminder</heading>
7           <body>Don't forget to buy milk on the way home!</body>
8       </note>
9       <note status="read">
10          <to>Mona</to>
11          <from>Jani</from>
12          <heading>Reminder</heading>
13          <body>It's my birthday tomorrow!</body>
14      </note>
15      <note status="read">
16          <to>Danica</to>
17          <from>Jani</from>
18          <heading>Cleaner!</heading>
19          <body>Thank you for doing the dishes yesterday!</body>
20      </note>
21      <note status="unread">
22          <to>Mona</to>
23          <from>Jani</from>
24          <heading>Thank you so much</heading>
25          <body>Thank you so much for the awesome present! I love it! =)</body>
26      </note>
27  </messages>
```

Question 15

Which line number shows an element that has element contents?

A. 1

B. 9

C. 18

D. 25

Question 16

Which line number shows an example of an attribute?

A. 1

B. 9

C. 18

D. 25

Question 17

Which one of the following gives examples of an information system goal and an information system objective for a new product marketing system?

	Goal	Objective
A.	will support foreign languages	will promote the brand of the company
B.	will increase sales by 25%	will increase market dominance
C.	will increase profits	will be easy to use
D.	will be attractive	will be twice as fast as the old system

Question 18

Marion has just finished writing software that connects to an external system and downloads millions of financial records. Her software processes the downloaded records and produces financial reports.

One characteristic that the data she downloads should have in order to maintain its integrity is

A. clarity.

B. usability.

C. reasonableness.

D. speed of processing.

Question 19

Selim is a system developer who works from home two out of five days a week. He connects to his work from his home computer using a secure connection through his broadband internet connection. This secure connection requires a username and password for him to connect to his work.

Selim is most likely using

A. GPRS.

B. LAN.

C. PGP.

D. VPN.

Question 20

Wanda moved all of her old personal files from her work computer system to an external solid-state drive (SSD). She put the SSD in her bag but, when she got home, the SSD no longer worked in her computer system. Wanda is very upset because, although the files were old, they included financial information and private medical documents that she knew she might need in the future.

What best describes the threat that has affected Wanda's files?

A. event-based

B. accidental

C. deliberate

D. security

END OF SECTION A
TURN OVER

SECTION B – Short-answer questions

Instructions for Section B

Answer **all** questions in the spaces provided.

Question 1 (1 mark)

Joan is writing a software requirements specification (SRS) for a new system. She has just finished adding a non-functional requirement that states the system must be translated into Italian, Greek and Japanese.

What measure of effectiveness best describes this requirement?

_____

Question 2 (2 marks)

Annabelle is constructing a trace table as part of the development stage of a project she is working on.

Explain the purpose of a trace table when developing software.

_____

_____

_____

Question 3 (4 marks)

Using specific examples, describe **two** factors that influenced the effectiveness of your project plan in your School-assessed Task (SAT) this year.

_____

_____

_____

_____

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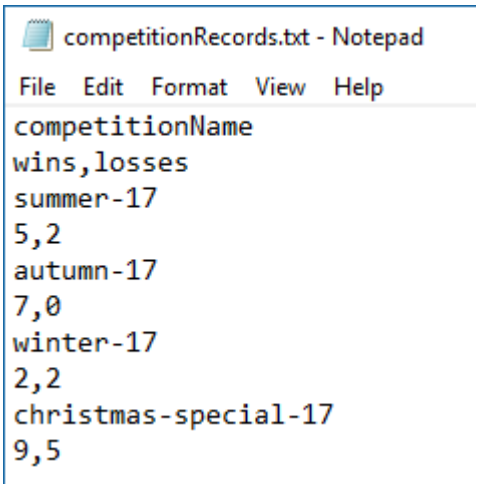
_____

_____

Question 4 (3 marks)

Alana is a competitive gamer who frequently participates in eSports competitions. She tracks all of her wins and losses in each competition in a plain text file. She would like to be able to search through the file for her wins and losses for any particular competition.

Competitions have unique names. A small sample from the plain text file is shown below.



Complete the pseudocode below so that it uses a linear search to print all of the wins and losses for a particular competition.

```
Algorithm searchForCompetition
Begin
      Input competition    // the name of the competition to find
      Input allEntries     // an array of all lines from the file, as strings
                           // where the index value begins at 0
```

Question 5 (4 marks)

Donna is a data specialist at a large marketing company. As part of her job, she obtains large databases from various online resources. She writes programs to sort through each data set to identify patterns and establish relationships using data analysis. Once the data has been analysed, she creates infographics to be used by her company's market research department.

a. What type of processing is Donna completing as part of her job?

1 mark

_____

b. A sorting algorithm that Donna frequently uses is selection sort.

Explain how selection sort works.

3 marks

_____

_____

_____

_____

_____

Question 6 (6 marks)

Rosemary is a system administrator at an accounting company. The company has recently upgraded their financial system so that it can be accessed at the office and remotely via the internet. The financial system data is stored in a secure server-room on the company's premises. Rosemary is reviewing the company's data security practices as part of the upgrade.

For each of the following threats to the integrity and security of the accounting company's data, explain the risk that the threat might pose to financial records and describe steps Rosemary can take to better protect them.

Staff remotely using a personal laptop that has malware _____

_____

_____

_____

_____

_____

_____

Staff accessing the financial system using public wi-fi hotspots _____

_____

_____

_____

_____

_____

_____

END OF SECTION B
TURN OVER

SECTION C – Case study

Instructions for Section C

Please remove the insert from the centre of this book during reading time.

Use the case study provided in the insert to answer the questions in this section. Answers must apply to the case study.

Answer **all** questions in the spaces provided.

Question 1 (2 marks)

State **two** functional requirements of the receivers in the Kodo system.

Requirement 1 _____

Requirement 2 _____

Question 2 (2 marks)

Explain **one** constraint in the Kodo system.

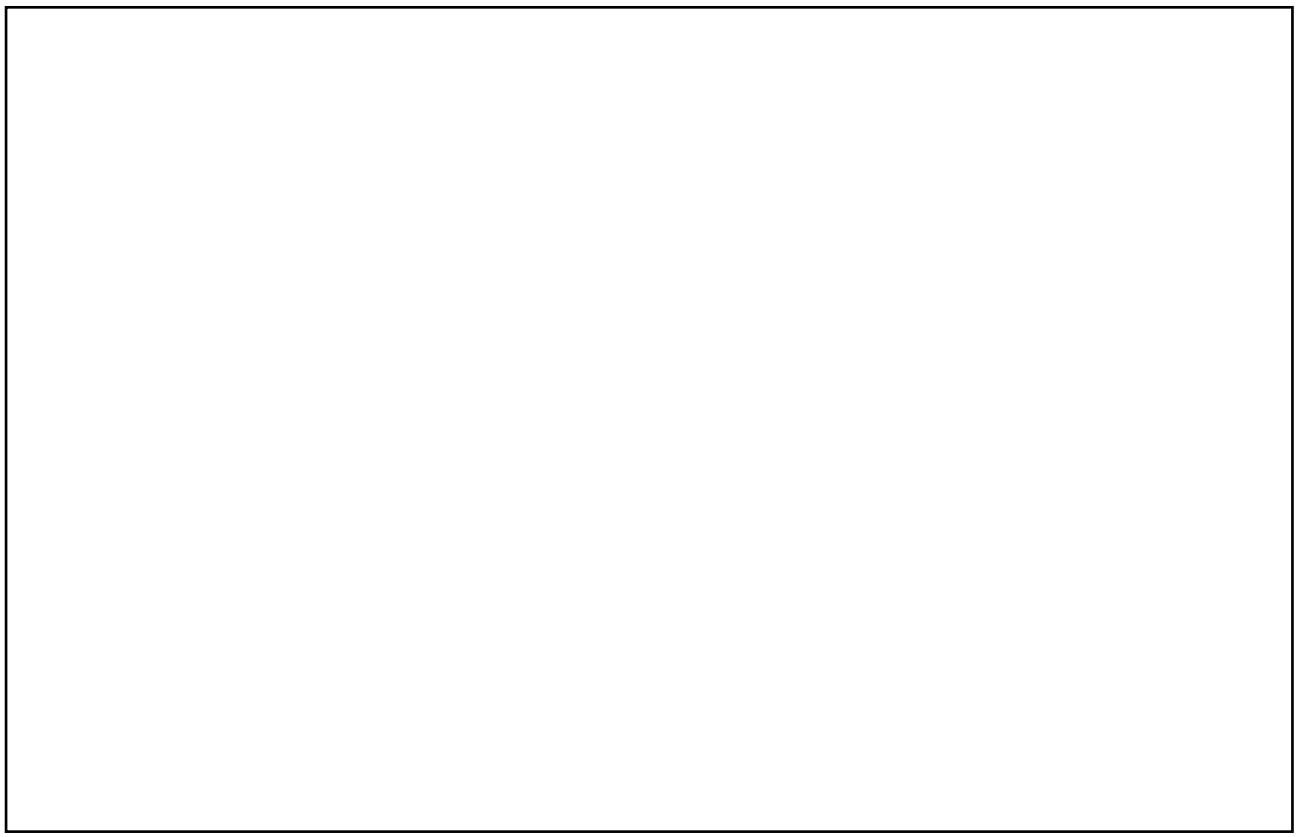
_____

_____

_____

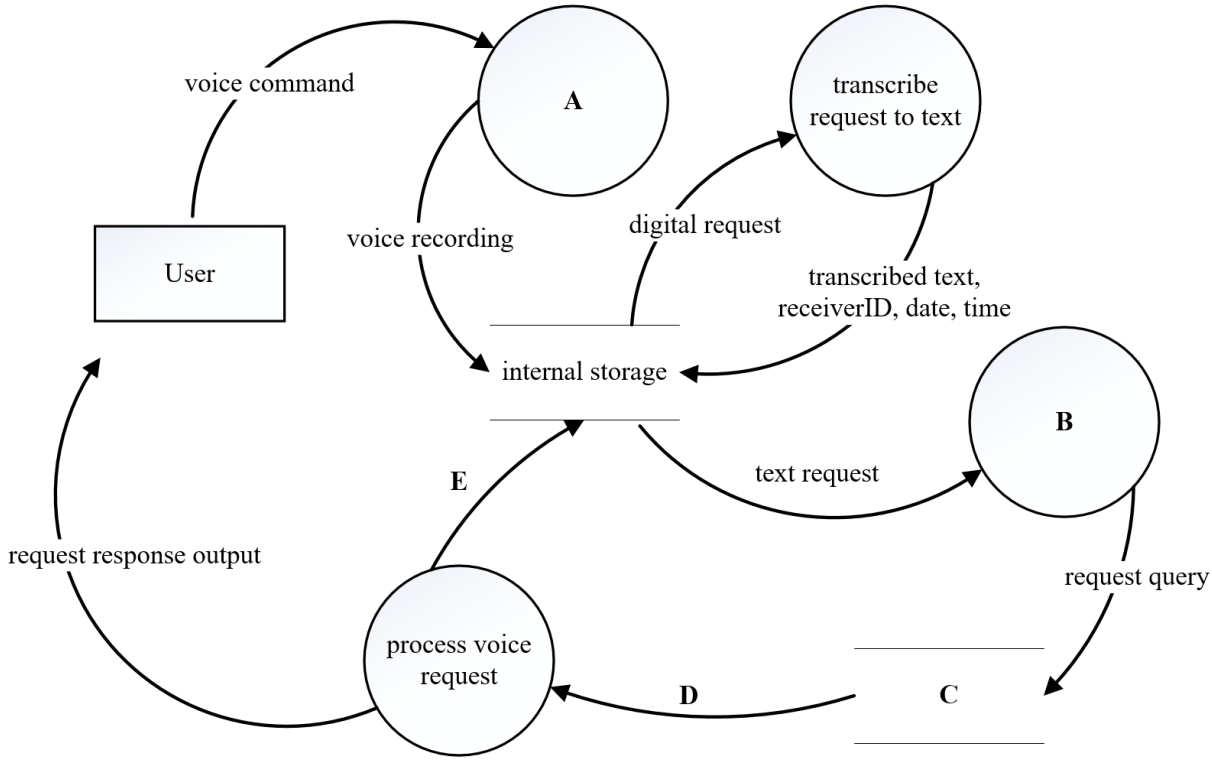
Question 3 (5 marks)

Draw a use case diagram that represents the Kodo system.



Question 4 (5 marks)

Satoshi was reviewing hand-drawn project documents when he spilled coffee on the data flow diagram. Some of the diagram is now unreadable. He has redrawn the damaged section of the diagram as best he can.



Complete the data flow diagram by writing the correct labels for A, B, C, D and E in the spaces provided below.

A _____

B _____

C _____

D _____

E _____

Question 5 (3 marks)

Satoshi intends to install the Kodo system in his house as part of the testing process. He wants all receivers to be able to transmit to the main unit throughout his entire home, including the external patios and backyard.

a. Taking into account only technical constraints, what is the minimum number of receivers Satoshi should install? Justify your response.

2 marks

_____

_____

_____

b. Satoshi would like to increase security around his home to reduce the risk of someone stealing the Kodo system.

Describe **one** addition to the physical or software controls at Satoshi's home that will better protect the Kodo system.

1 mark

_____

_____

_____

Question 6 (4 marks)

The Australian government has recently signed a contract with Kodora to modify Kodo by adding in a hidden feature. The hidden feature can be activated by changing a configuration file on any main unit. This feature would change the requirement for the 'Hello, Kodo' activation request to be said before anything is recorded. Instead, they want Kodo to record and process all spoken language that its receivers detect but return the output to report to the person speaking only if the activation request was used. All transcribed text from the recordings would be accessible from the secure reporting system.

Serai has approached Satoshi to make these new changes to Kodo but he is reluctant to do so. When asked why, he explained that he did not think that what the government wanted complied with all the legal obligations Kodora has when releasing their new product to the public.

Explain why Satoshi is concerned, referring to all relevant legislation.

Question 7 (4 marks)

Satoshi is currently working on designing the module that will work in the main unit of the Kodo system. It receives a request from a receiver, transcribes it to text and stores it in the internal database. It then connects to the online database to get the results from the text analysis. The result is returned in a single file that is then processed into a single output to be returned to the receiver. Once the output is returned, the voice recording is deleted.

The pseudocode for this module is shown below.

```
Algorithm receiveRequest()
Begin
     Input receiver, voiceRequest
     currentDateAndTime ← DateAndTimeNow()
     strRequest ← transcribeToText(voiceRequest)
     store(strRequest, receiver, currentDateAndTime)
     onlineConn ← new connection to online database
     analysedRequest ← onlineConn.analyse(request)

     nextLine ← getLine(analysedRequest)
     While nextLine = "EndOfFile" Do
          output ← output + nextLine
          nextLine ← getLine(analysedRequest)
     EndWhile
     If output is not empty Then
          receiver.receiveOutput(output)
     EndIf
     delete(voiceRequest)
End
```

a. Satoshi has just finished writing the code, but when he runs it, it does not produce the result he wants. He realises that there must be an error in the pseudocode.

Explain the major error in the `receiveRequest` algorithm.

2 marks

_____

_____

_____

_____

b. Explain how to fix the error in the algorithm. Where any code needs to be rewritten, write the line in full.

2 marks

_____

_____

_____

Question 8 (4 marks)

The Kodo system keeps statistics every time it is used so that a summary report can be created when needed.

Shown below is an extract from the Kodo data dictionary, listing variable names and explaining how the variables will be used in development.

From the following list of data types and structures, select the most appropriate type or structure for each variable and its accompanying explanation. Write your selection in the spaces provided below.

integer floating point Boolean character string array record

Variable name	Data type or structure	Explanation
frequency_used		How often Kodo was used (per day) in the given time period
receiver_mostused		The name of the receiver that was used most often in the given time period
time_period		Total days to be used when calculating statistics
all_requests		All of the saved requests in the given time period

Question 9 (11 marks)

A user can use any networked device on their home network to access the reporting system. When they navigate to the reporting log in page, they must enter their username and password before they can view the statistics stored in the main unit. When setting up the Kodo system, users must select a password that meets certain conditions.

The following pseudocode is used to verify that a chosen password is valid before allowing it to be used.

```
Algorithm verifyPassword
Begin
     Input password
     passedCheck ← True
     If length(password) < 8 Then
          passedCheck ← False
     EndIf
     If hasPunctuation(password) <> True Then
          passedCheck ← False
     EndIf
     If hasUpperCaseLetter(password) <> True Then
          If hasNumber(password) <> True Then
               passedCheck ← False
          EndIf
     EndIf
     Return passedCheck
End
```

a. Complete the following test table so that the pseudocode is fully tested. For each test, include the reason for the test and the expected return result from the algorithm.

8 marks

Test no.	Password	Reason	Expected return result
1	B3tOnBTC!	All password requirements are met	True
2			
3			
4			
5			

b. The `hasNumber()` algorithm checks each character of the input password to see if it is a number.

What is this validation technique called?

1 mark

_____

c. The algorithm as it is written is not the most efficient solution.

Explain why, including a suggestion of how to improve it.

2 marks

_____

_____

_____

_____

Question 10 (2 marks)

Satoshi would like to use data mining to help improve Kodo's specialised online search database.

Explain what data mining is and how it might help Satoshi to improve the specialised database.

_____

_____

_____

_____

_____

_____

Question 11 (6 marks)

When approving the design of the Kodo system, Serai must consider the factors that influence the design of a solution: usability, affordability, security, interoperability and marketability.

Which three factors are the most relevant for Serai to consider? Explain why.

Factor 1 _____

_____

_____

Factor 2 _____

_____

_____

Factor 3 _____

_____

_____

Question 12 (4 marks)

Once development of the Kodo system has been completed and tested internally, usability testing must be conducted.

Explain the goal of usability testing and describe an appropriate technique that could be used for usability testing of the Kodo system, including forms of documentation.

_____

_____

_____

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_____

_____

_____

Question 13 (2 marks)

Satoshi has been reviewing the design documentation for Kodo, and he is worried about what will happen to the main unit's internal storage if a user never logs in to delete old request data. To reduce costs, the internal storage is only 500 MB and, despite all requests being saved as text, at some point the storage will fill up completely.

Suggest a modification to the disposal functionality that Satoshi could implement that will resolve this problem while still keeping as many old requests as possible. Give a reason for your suggestion.

2 marks

Question 14 (2 marks)

Satoshi has decided that he will allow users to purchase archive cloud storage.

Explain the difference between archiving and disposal.

2 marks

Question 15 (4 marks)

Serai has been approached by Walter, a salesperson from a local data intelligence company. Walter would like to create a partnership with Kodora to share access to each company's specialised search database. He believes that doubling the size of the intelligent search databases will improve the accuracy of both company's search-based products.

Before Serai agrees to this partnership, she must consider the risks to the integrity of the data in Kodo's specialised search database.

a. State and explain one risk in relation to data integrity that may affect the effectiveness of the Kodo system.

2 marks

_____

_____

_____

_____

b. Walter reassures Serai that she does not need to be concerned about data integrity, as his company uses XML for data transfers.

Explain **two** advantages of using XML as a file format in relation to reducing the risk of diminished data integrity.

2 marks

_____

_____

_____

_____

END OF QUESTION AND ANSWER BOOK