

i Front page

UNIVERSITY OF OSLO

The Faculty of Mathematics and Natural Sciences

Written examination DIGHEL4360

2022 AUTUMN

Duaration: 15 December at 9 to 15 December at 13

Permitted aids: None

It is important that you read this front page before you start.

The purpose of the assignment is to test the knowledge and skills that you have acquired through your participation on the course 'DIGHEL4360 Information Technology in Health Services'. When responding to the assignment, consider the following:

- No assisting material (literature, personal notes, internet etc.) is permitted during the exam.
- You may answer in English or a Scandinavian language
- Length: There is no minimum or maximum word limitation. The recommended combined length for tasks 10,11, and 12 is a maximum of 1000 words.
- Read all questions carefully
- In the multiple choice tasks, marking wrong answers will count negatively. Note: Zero is the lowest possible final score for each task.
- For all programming the emphasis is on logic and understanding rather than correct syntax.

1 Task 1 Programming

Counts 10%

We will now have a look at some basic concepts in programming. Consider this code, which is used by psychiatrists prescribing medication:

```

normal = ["Efexor", "Lithium", "Lamictal", "Seroquel"]
habit_forming = ["Diazepam", "Zolpidem", "Lorazepam"]
narcotic = ["Adderal", "Amphetamine"]
drug = input("Enter the name of the drug to prescribe: ")
if drug in normal:
    print("You have prescribed a safe drug")
elif drug in habit_forming:
    print("Warning: this drug can be habit forming")
elif drug in narcotic:
    print("Warning: this drug is on the list of narcotic drugs")
else:
    print("Unknown drug, try again")

```

Task 1A

Explain in a few sentences the structure of the program and what it does.

Task 1B












This code uses variables and if-statements. Explain in short terms the following concepts:


- Variable
- If-statement

Task 1C

Consider the case in which a drug is moved from one category to another, and you have to move a drug from one list to another. Explain what the list operations append and remove do.

Fill in your answer here

Format | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  |  |  |  |  |  |



Words: 0

Maximum marks: 10

2 Task 2 Programming

Counts 15%

Take a look at the following program:

```
patient = input("Enter the name of the patient: ")
medications = []
new_med = ""
while new_med != "quit":
    new_med = input("Enter name of new medication: ")
    medications.append(new_med)
print("The patient", patient, "takes the following medications:")
print(medications)
```

Task 2A

This program uses a loop. Explain in general what a loop is.

Task 2B

In this code we used a while loop. Previously we have also used the for loop. Why is it more appropriate to use a while loop rather than a for loop in this program?












Task 2C


Why is the variable new_med declared before the loop?

Task 2D

When using this program, the word "quit" will always be part of the list of medications. Why is that, and how would you go about to fix this problem?

Fill in your answer here

Format ▼ | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  |  |  |  |  |  |



Words: 0

Maximum marks: 15

3 Task 3 Programming

Counts 5%

The following file, called patients.csv, contains data for patients booking an appointment to a dentist's office over a single week. Each line represents one day (Monday-Sunday) and shows how many appointments there are per day:

8

13

6

11












10


2

3

You are tasked to implement an algorithm that finds the average number of patients per day throughout the week. Design your algorithm and explain how it works step by step. You can answer as plain text, pseudo-code or Python code.

Fill in your answer here

Format ▾ | **B** *I* U x_2 x^2 | I_x |   |    |   |   |  |  |



Words: 0

Maximum marks: 5

4 Task 4 Databases

Counts 10%

Given the following table containing data on movies, their actors and the roles the actors play in that movie:

MID	Title	Prod	AID	ActorName	Role
1	The Matrix	1999	23	Keanu Reeves	Neo
2	Star Wars	1977	45	Mark Hamill	Luke Skywalker
1	The Matrix	1999	98	Carrie-Ann Moss	Trinity
3	Speed	1994	23	Keanu Reeves	Jack Traven
4	The Prestige	2006	28	Hugh Jackman	Robert Angier
4	The Prestige	2006	28	Hugh Jackman	Gerald Root

Here, MID is a unique ID for movies, and AID is a unique ID for actors, Title is the title of the movie, Prod is the year the movie was produced, ActorName is the name of the actor and Role is the name of the character the actor played in that movie.

1. Give examples of data duplication in the table above.
2. Make a database (i.e. a collection of tables) with a better structure containing the same data as the table above.

Fill in your answer here

Format | **B** | *I* | U | x_2 | x^2 | I_x | | | | | | | Ω | | | Σ |

Words: 0

5 Task 5 Databases

Counts 10%

Given the following table on products from a particular general store:

album:

product_id	name	category	price
1	TV	Electronics	9995
2	Rice	Food	39
3	Socks 6pc	Clothing	199
4	Laptop	Electronics	8599
5	Blueberry	Food	27
6	Chocolate	Food	45
7	Headset	Electronics	899
8	Sweater	Clothing	849
9	Pants	Clothing	1099

where product_id is a unique ID for products, name is the product's name, category is the name of the category of the product, price is the price of the product.

1. What would the following query return:

```
SELECT category
FROM product
WHERE name = 'TV';
```

2. What would the following query return:

```
SELECT name, category
FROM product
WHERE price > 1000 OR vat = 0.25;
```










3. What would the following query return:


```
SELECT min(price) AS price_cheapest
FROM product
WHERE category = 'Electronics';
```

4. Write an SQL-query that finds the name and category of all products having a price greater than 1000 or less than 500.

5. Write an SQL-query that finds the number of products in the Clothing category with a price below 1000.

Fill in your answer here

Format ▾ | **B** *I* U x_2 x^2 | I_x |   |    |   | Ω  |  | Σ |



Words: 0

Maximum marks: 10

6 Task 6 Encryption

Counts 2%

Mark the statement(s) about symmetric encryption that are true.

One or more options might be correct.

Select one or more alternatives:

- The security of symmetric encryption algorithm depends on the number of possible keys
- Symmetric encryption is a rather new concept invented in the 20th century.
- Symmetric encryption ensures authenticity, i.e., to identify the sender
- Symmetric encryption uses the same key for encryption and decryption

Maximum marks: 2

7 Task 7 TLS

Counts 2%

You are visiting the Web page <https://www.online-shop.com/> (i.e., you are using TLS). Mark the statements that are true.

Velg ett eller flere alternativer:

- The connection is guaranteed with the host www.online-shop.com
- The Web page is guaranteed a phishing page
- The Web page is guaranteed not a phishing page
- If you enter your credit card number on the Web page, an adversary eavesdropping on the wire can see it.










Maximum marks: 2


8 Task 8 Confidentiality

Counts 3%

One important security goal in information security is confidentiality. Pick an example from your daily (digital) life where confidentiality is important. Explain what might happen if an attacker could get access to the confidential data.

Fill in your answer here

Format ▾ | **B** *I* U x_2 x^2 | I_x |   |    |   | Ω  |  | Σ |



Words: 0









Maximum marks: 3


9 Task 9 Phishing

Counts 3%

Please explain what phishing is and how it can be detected.

Fill in your answer here

Format | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  | Ω |  |  | Σ |



Words: 0










Maximum marks: 3


10 Task 10 Agile development

Counts 13,3%

What can be some potential challenges of using agile software development in larger public-sector IT projects?

Fill in your answer here

Format | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  |  |  |  |

Σ | 

Words: 0











Maximum marks: 13.3


11 Task 11 Digitalization

Counts 13,3%

Discuss similarities and differences between “IT” projects and “digitalization” projects

Fill in your answer here

Format | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  |  |  |  | 

Σ | 

Words: 0











Maximum marks: 13.3


12 Task 12 Public sector IT project challenges

Counts 13,3%

Outline a set of challenges that you argue contribute to the high failure rate of larger IT projects in the public sector

Fill in your answer here

Format ▾ | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  |  |  |  |  |

Σ | 

Words: 0

Maximum marks: 13.3