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Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 2 Digital Technologies and Hangarau Matihiko 2023

**91898 Demonstrate understanding of a computer
science concept**

EXEMPLAR

Merit

TOTAL 05

INSTRUCTIONS

There are three questions in this assessment, on the topics of:

- Artificial intelligence ([page 3](#)) • Computer security ([page 9](#))
- Encryption ([page 15](#)).

Choose only ONE question to answer. Note that parts (c), (d), and (e) of the question include options for you to choose from.

Read all parts of your chosen question before you begin. Do not repeat information in different parts of the assessment.

EITHER: QUESTION ONE: Artificial intelligence (a)

(i) Choose one of the following companies:

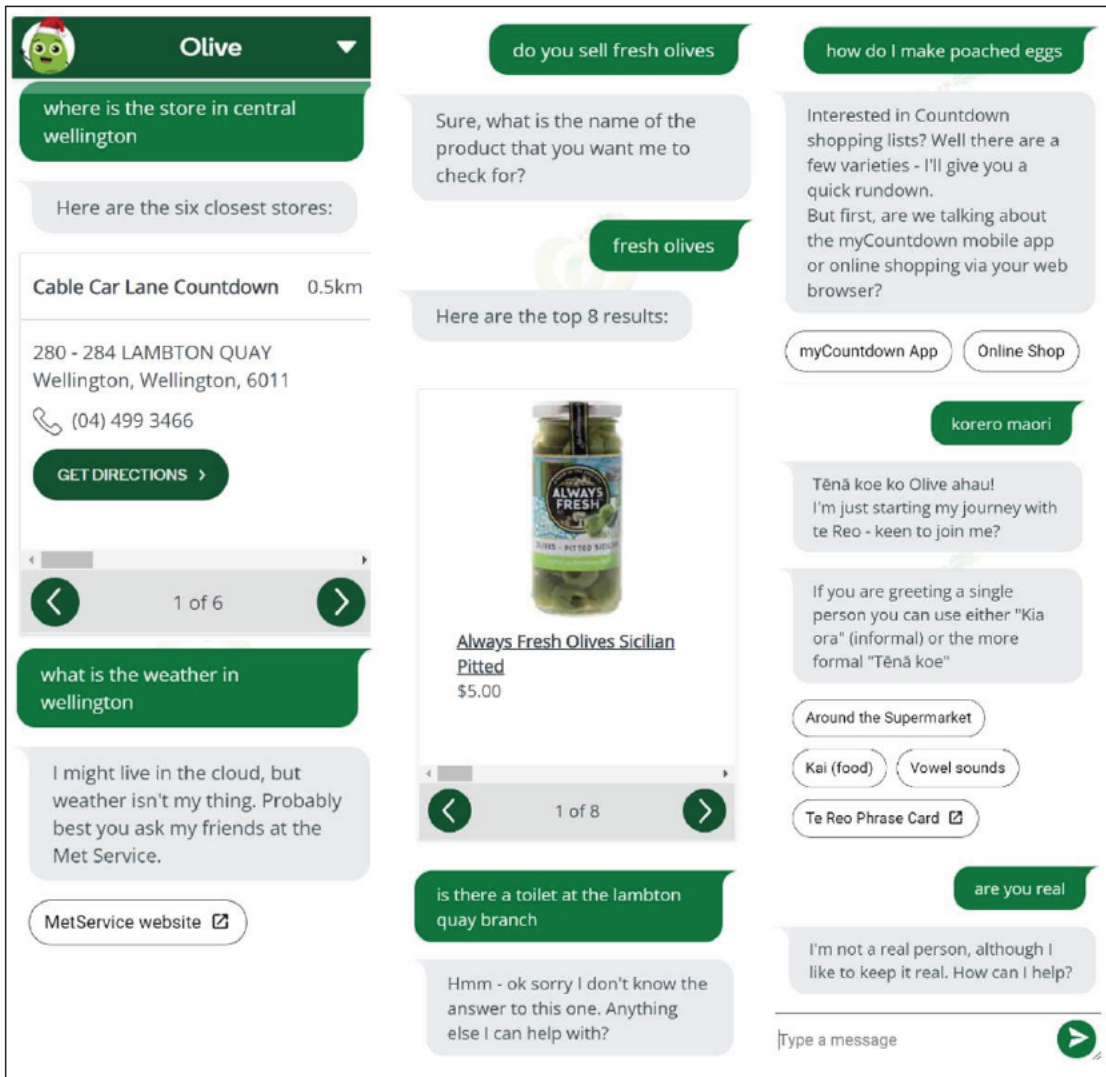
- Apple
- Microsoft
- Amazon
- Google (including Waymo)
- Meta (including Facebook)
- Tencent (WeChat)
- ByteDance (TikTok)

Company:

(ii) How does this company use artificial intelligence?

(iii) What are at least TWO advantages of this company using artificial intelligence?

Refer to the *Countdown* chatbot interactions below in your answer to part (b). Your answer must be based only on what you see in the screenshots; you may not access the internet.



(b) (i) How effective is this chatbot in performing the task it was designed for?

(ii) Describe at least one technique used by the chatbot.

Choose ONE of the following to answer:

(c) •

What factors need to be considered to train the AI in a self-driving car?

OR

- Give an example of how an artificial intelligence is evaluated.

Choice (copy and paste below)

Response

Choose ONE of the following to answer:

-

(d)

How can the impact of human factors be considered when developing artificial intelligence for self-driving cars?

OR

- What are the potential positives of future-proofing an artificial intelligence?

Choice (copy and paste below)

Response

Choose ONE of the following to answer:

•

(e)

Many smaller businesses do not have an online solution that includes artificial intelligence. Explain the advantages and disadvantages of this. *OR*

- Refer to the company you discussed in [part \(a\)](#). Explain some key issues your chosen company faces in developing artificial intelligence solutions for the products they create.

Choice (copy and paste below)

Choose ONE of the following to answer:

-

Response

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OR: QUESTION TWO: Computer security

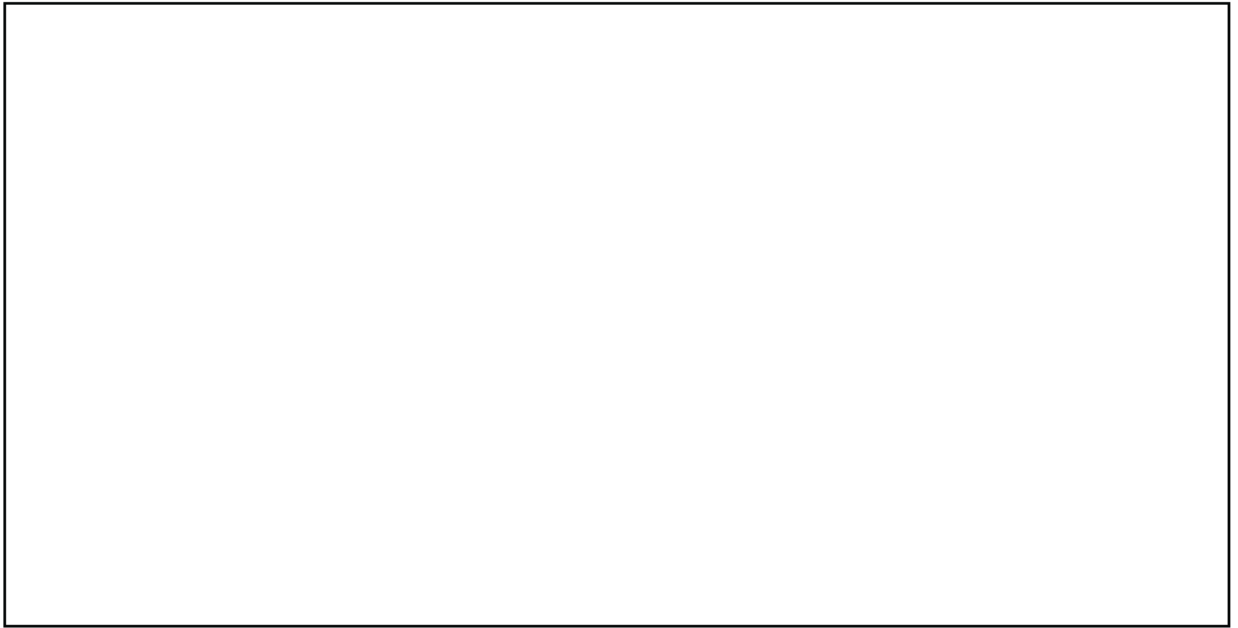
(a) (i) Choose one of the following companies:

- Apple
- Microsoft
- Amazon
- Google (including Waymo)
- Meta (including Facebook)
- Tencent (WeChat)
- ByteDance (TikTok)

Company:

(ii) What issues does this company face to protect the security of its users?

(iii) What are TWO steps this company has taken to deal with these issues and protect its users?



Refer to the email below in your answer to part (b). Your answer must be based only on what you see in the screenshot; you may not access the internet.

From: facebook@freemail.com
To: jakematerich12345@nzmail.com

Dear jakematerich12345
FACEBOOK ANNUAL FEE
Your Facebook fees are overdue and your account will be DELETED very very soon
We at FacBook have previously contacted you. This is your FINAL not ice. FIX IT NOW
If you do not use Facebook anymore you must pay a fee to close your account. If you Do NOT all information including bithdays, password etc etc will not be protected and can be seen by anyone who wants to knoe
Make sure you protect yourselves by clicking on this [link](#) NOW. This will take you to a special secret Facebook server that has many many layers of protection to keep you safe
The annual fee is \$99USDollars. If you want to seculey close your Twitter account then it will cost \$149USD Dollars

We are disappointed you have not already paid this fee and you must PAY it NOW to keep your facebook account open and to protect all your really really confidential data

Pay now by clunking on the link to demostate what an intelligent person you are

Jo Santa
kooxda ammaanka buugaagta

(b) (i) Discuss the warning signs that this email may not be genuine.



- (ii) Explain what actions should be taken in response to receiving this email.



Choose ONE of the following to answer:

(c) •

What are the main reasons organisations require their clients to use two-factor authentication?

OR

• What is reCAPTCHA, and how does it help limit criminal activity?

Choice (copy and paste below)

Response

Choose ONE of the following to answer:

-

(d)

How can an organisation protect against the impact of human factors with computer security?

OR

- What can be done to future-proof computer security against unknown threats?

Choice (copy and paste below)

Response

Choose ONE of the following to answer:

•

(e)

What advice would you give to a young person to protect themselves and their computer when going online for the first time? Explain the reasons for your advice.

OR

- Refer to the company you discussed in [part \(a\)](#). Your chosen company has considerable data on their clients and their habits. Explain the risks to the clients in the ways the company may choose to make use of this data.

Choice (copy and paste below)

Choose ONE of the following to answer:

-

Response

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OR: QUESTION THREE: Encryption

(a) (i) Choose one of the following companies:

- Apple
- Microsoft
- Amazon
- Google (including Waymo)
- Meta (including Facebook)
- Tencent (WeChat)
- ByteDance (TikTok)

Company: Meta (including Facebook)

(ii) How does this company use encryption?

Meta, formerly known as Facebook, is a company that has created many different platforms for social media. This involves Facebook, Whatsapp and Instagram. Meta has used a variety of different types of encryption methods for both their webbrowser platforms and their app platforms. This involves hashing, asymmetrical encryption and symmetrical encryption. This encryption ensures that the users information is safe and secure.

Meta uses hashing for their passwords to ensure the users password can not be cracked. Unlike asymmetrical encryption, hashing is only a one way process where only one key is needed. Instead of needing to use another key to decrypt it, it only needs the user to verify it. Hashing works by using a set sequence of characters to mix within the givin password. This then creates a new output that would take millions of years to crack.

Meta also uses asymmetrical encryption for sending messages on their social platforms such as "Whatsapp". This social media platform is well known for its security hence why used by millions of people. Asymmetrical encryption works by having a public key and a private key. The sender uses the public key to encrypt the information and the receiver uses a private key (only they know) to decrypt the information. This is encrypted using a variety of techniques that include mathematical equations and sequences, as well as mixing and swapping out letters. By using this type of encryption method, if in any case a message was to be intervened with the information would still be secure.

On top of that **Meta** also uses symmetrical encryption. This type of encryption method works by both users having the same private key. By doing so both users can send and receive information that both can encrypt and decrypt with the same key. This is a secure method as both users are the only ones who know the private key.

Meta also uses HTTP(S). This is a secured link that is used by **Meta** on their online web browser platforms in the formate of https:// and provides a secure environment to the user ensuring no details are being stolen or looked for.

Meta overall has an astonishing encryption system where users are at peace of mind knowing their information is safe and secure.

(iii) What are at least TWO advantages of this company using encryption?

The advantages of **Meta** using encryption is endless but two that stood out was the users information is safe and the passwords are secure. By using any social media platform created by **Meta** the users information is safe. By **Meta** inputing asymmetrical encryption practices users can send information to and from one another without information being stolen on the way. This works by the user whom is sending uses a public key to encrypt the information and the receiver to use a private key to decrypt the information. This ensures the users information is secure with them and the receiver.

Another advantage of this company using encryption is knowing that the users account will be safe from hackers. In nowadays people are getting smarter with hacking and computers are becoming increasingly faster. But with **Meta's** encryption standards as high as they are, users accounts are safe. Hashing is one of the many good encryption methods that **Meta** uses to ensure passwords are secure. Hashing works by using a set sequence of characters to mix within the givin password. This overall will take millions of years to crack.

Overall **Meta** is a very safe and secure company that ensures user who are using their platforms can rely on their encryption standards.

Refer to the random password generator below in your answer to part (b). Your answer must be based only on what you see in the screenshot; you may not access the internet.

(b) (i) What are the advantages and disadvantages of using a password generator?

The advantages of using a password generator include the random selection of characters involved in making the password. As shown in the picture above the generator provides options to include symbols, ambiguous characters and brackets. This creates a wider range of random selection for the password. Another advantage to using this random password generator (Calculator.net) is that as stated in the picture above that the generator is safe and secure. It states, "To ensure the security, the password is generated completely on the webpage without being sent across the internet." This ensures the user that the password is safe being generated on the website.

Some disadvantages of using a password generator is that the user will have no idea how to remember it. Although the password may be secure or not, the user will have a hard time remembering what it is. Another disadvantage from the picture above is that it has generated a very weak password. By using a weak password it is easier to crack making whatever you used the password for insecure.

(ii) Is it a good idea to use these settings to generate different passwords for all accounts? Explain why or why not.

It is not a good idea to use the settings used from the picture above. This is because the user will have a hard time remembering the password and the password will be insecure as a good password would normally contain at least eight figures but in these settings the password only contains five. Another reason the user shouldn't use these settings is because the password could also have repeating letters. This makes a password much weaker.

Choose ONE of the following to answer:

(c)

- Explain what HTTPS is and why it is recommended instead of HTTP. OR
- Explain the difference between how encryption works on passwords compared to how it works on private / public keys.

Choice (copy and paste below)

Explain the difference between how encryption works on passwords compared to how it works on private / public keys.

Response

Encryption works differently between passwords and private / public keys. By encrypting passwords we use an encryption method called Hashing and by using an encryption method that includes a private and public key is called asymmetrical encryption. Unlike asymmetrical encryption, hashing is only a one way process where only one key is needed. Instead of needing to use another key to decrypt it, it only needs the user to verify it. Hashing works by using a set sequence of characters to mix within the given password. This then creates a new output that would take millions of years to crack. On the other hand there is asymmetrical encryption. Asymmetrical encryption works by having a public key and a private key. The sender uses the public key to encrypt the message and the receiver uses a private key (only they know) to decrypt the message. This method works by using a variety of techniques to encrypt the information such as using mathematical equations and mixing up letter and using different sequences that only the private key can decrypt. By using this type of encryption method, if in any case a message was to be intervened with the information would still be secure.

The key differences between encrypting passwords compared to how it works on a private / public keys is that passwords are only a one way encryption that uses verification to ensure the password matches the encrypted/hashed output. Whereas a private / public key uses a two way method that involves sending information that has been encrypted using different mathematical equations and sequences and receiving information to decrypt using a private key.

Choose ONE of the following to answer:

•

(d)

After an organisation has a data breach, how can it future-proof to reduce the impact?

OR

- What are the human factors an organisation must consider when it closes down and has a large amount of customer data?

Choice (copy and paste below)

After an organisation has a data breach, how can it future-proof to reduce the impact?

Response

After an organisation has a data breach it is essential to make sure encryption methods are up to standard. The organisation, to reduce the impact, may shut off information completely so that it can not be stolen. For future proofing the organisation will need to change their encryption to a high standard one. This may include using a quantum super computer to devolope mathematical equations and sequences only super computers would be able to create. By using a quantum computer this would completely eliminate the risk of having another data breach as for todays computers are not able to function with the speed and capability to even try and crack the information.

(e)

Criminal activity on the internet is increasing, with many individuals and organisations losing large amounts of money. Explain what can be done to combat this problem. OR

- Explain a major development in computer encryption and why it is important.

Choose ONE of the following to answer:

•

Choice (copy and paste below)

Explain a major development in computer encryption and why it is important.

Response

Encryption has been used since world war II where Germany would use a very old type of encryption to send war messages. This involved using the same key to encrypt it and the same key to decrypt it making it very easy to decrypt if the information had been intervened.

Nowadays encryption has developed so much to keep up with the computers we have today. The faster the computers get the easier the information is to crack hence why it is important that encryption standards keep on top of the fast computers we have today.

Computer encryption has developed so much that now we have super computers called quantum computers. These computers have the power and capability of creating complex strategies and calculations to encrypt information so that it would take millions if not billions for the average super computer to solve. Although this computer is very good for encrypting information it is also capable of cracking information that had been encrypted by old encryption methods. This is why it is important that development keeps happening in computer encryption so that the worlds information is safe.

Merit

Subject: Digital Technologies and Hangarau Matihiko

Standard: 91898

Overall grade: 05

Grade	Marker commentary
M5	<p>The candidate demonstrated mostly sound knowledge of their chosen topic (encryption).</p> <p>The candidate limited themselves in their discussion of asymmetrical encryption and hashing in two different responses.</p> <p>Where there was a choice, the candidate sometimes answered both options.</p> <p>When writing responses, it is good to justify answers and not just say something is a risk (such as in the candidate's response for quantum computers).</p> <p>To move into the Excellence band, the candidate would need to provide more depth in their answers.</p>