QUESTION 1 **(Total: 24 marks)**

a) In the guest lecture by Simon Pincus, titled "Processes in the Wild", he described four types of development organisations:

i. internal IT departments,
ii. professional services / consulting companies,
iii. research and development / engineering product development companies, and
iv. research and development software services companies.

For each type of organisation, select a software engineering process model that you believe would be suitable for their development context. Provide a justification for your choices. The justification must identify what characteristics of the process model meet the unique needs of each type of organisation.

(12 marks)

b) The steps that make up the details of a use case can be described using a textual description, an activity diagram or an interaction diagram.

i. What are the advantages and disadvantages of each approach to describing the details of a use case?

(6 marks)

ii. For each approach, describe a situation where it would be the most appropriate way of describing a use case's detail. Provide an explanation of why it would be the most appropriate approach.

(6 marks)

a) Guest lecture? Bruh

b) What is a textual description? A use case description?

For situations in which there are many different pathways and methods of interaction, activity diagrams better model these alternative situations with the forking nodes. It is also clearer to see as it is a diagram, which is easier to process than a textual description. However, in situations where there are many actors involved in the use case, the partitions can make the diagram cluttered.

In situations where the use case has a simple direction, and the alternative scenarios are short and simple, use case descriptions can provide more insight into how each step interacts with the system. Each step contains more detail than an activity diagram. Also if there are many actors that interact with the user, this is more simply represented using a use case description. If there are many detailed alternative scenarios however, this can clutter the description, as the author must model each alternative scenario. This is particularly problematic if the alternative scenarios are very detailed, and they fork early in the use case.

QUESTION 2 **(Total: 10 marks)**

a) Imagine you have been told that an organisation had been rated to be CMMI level two. Describe two activities that you would expect to see occurring in projects. Explain why these types of activities would be expected of a CMMI level two organisation.

(4 marks)

b) Consider an organisation that has a disciplined approach to applying Kanban. The organisation also applies the technical practices from Extreme Programming (XP). What do you believe would be the highest CMMI level at which this organisation could be rated? Justify your answer. Explain which aspects of Kanban and XP contribute to your rating.

(6 marks)

a) .

1) The initial requirements defined at the start of the project being rigid, expensive to change. Deviations from the set plan are treated as mistakes needing to be corrected
2) Unpredictable performance that wavers depending on the complexity of current task, and other outside factors.

As stage two lacks process improvement, both of these scenarios are a result of a lack of flexibility. The lack of a documented and standardized process means that performance is unpredictable.

b)

XP is agile, meaning probably level 5. The process is self-improving, stable, and flexible.

QUESTION 3 (Total: 66 marks)

Consider a project that is developing a "digital health passport" mobile application for the Australian government. The digital health passport will access your "My Health Record" to retrieve data about your current health, past illnesses from contagious diseases, and your current immunisation record. This data will be encrypted and stored on the phone. The app will use this data to calculate a "travel fitness score".

Users of the digital health passport will need to connect it to their health record. They will be able to see their travel fitness score and to check if it is high enough to allow them to travel to a chosen destination. They can also view their health data that is stored on their phone. Users will need to set a password for access to the app on their phone and provide a key that will be used to encrypt their health data that is stored on the phone.

The app will provide an interface that allows officials to query the app. They will be able to check if you are currently suspected of having a contagious disease. They will also be able to check if you have immunity from specific diseases, due to a past illness with the disease or via an immunisation. This interface will be via nearfield communication (NFC). An application running on the official's mobile device will use NFC to query a digital health passport.

A risk has been identified that someone could build an app that uses NFC to query a digital health passport and retrieve personal data. The cost of this risk has been assessed as being $1,000,000, based on damage to company reputation and compensation costs. The probability of this risk occurring has been assessed as being 1%.

Two strategies are being considered to reduce the risk of inappropriate access to personal data. One strategy is to develop a custom encryption protocol to secure the NFC query. The cost of developing this encryption protocol is estimated to be $450,000. It is expected that this will reduce the risk to 0.001%.

The second strategy is to not use NFC to communicate between the apps. Instead, the official's app will generate a QR code based on their id and the current date and time. The digital health passport will scan this QR code and then generate a QR code that contains the data, and which is encrypted based on the official's QR code. The official can then scan the QR code generated by the digital health passport to get the query result. The cost of implementing this strategy is estimated to be $550,000. It is expected that this will reduce the risk to 0.00001%.

a) Which of these two risk reduction strategies is the better option? Provide calculations, that show your working out of the results, to support your answer. Also provide a descriptive explanation of your answer. Explain why it is better to choose one of these risk reduction strategies, or why it is better to not use either strategy.

REbefore = 1,000,000 * 0.01 = 10,000

1) ReAfter = 1,000,000 * 0.00001 = 10

R = 10000 - 10) / 450000 = 0.022

2) ReAfter = 1,000,000 * 0.0000001 = 0.1

R = 10,000 - 0.1) / 550000 = 0.018

Therefore better to choose to choose option 1 as it has a higher number, which is better.

Overall it is better not to choose either of these, as it is below one which is generally not worth doing. However considering the ethical nature of the risk, it should perhaps still be chosen.

(7 marks)

b) Identify one additional risk for the originally planned digital health passport, and one risk for each of the two risk reduction strategies. The risks for the risk reduction strategies need to be new risks introduced by that strategy. Categorise each risk's impact and probability, using NASA's risk matrix. For each risk, justify your selection of the impact and probability.

(6 marks)

1) Encryption protocol is inefficient and dramatically reduces the performance and execution time of the system.

Risk: Moderate
Despite the fact that it is technically only a performance issue, it could dramatically reduce the rate at which airport customs can let in users. This could result in users missing flights, cancellations, delays for which the system is held liable. The financial penalty that could be incurred could be larger, depending on how long the issue is present in the system.

Probability: Unlikely
If the encryption procedure is coded well, this is unlikely to turn into an issue, as the information that is encrypted are simple medical records, usually small in size and quick to encrypt. This also depends on the type of encryption used. 256bit AES encryption, for example, would take a longer duration.

2)

c) Select a software engineering process that would be suitable for this project. Provide an explanation as to why your selected process would be suitable. Your explanation should provide at least two reasons for your choice. Explain why the process model (i.e. plan driven, incremental, agile, lean, formal), to which your selected process belongs, would be a better choice than other process models. This explanation needs to provide at least one rationale for it being a better choice for each process model.

Yo who's typing :)