Introduction to Software Engineering
Assignment 5–Software Testing, Project Management and Planning

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Part 1: Software Testing (6 marks):

1. Identify one functional and one non-functional requirement related to that system

A functional requirement would be that users must be able to add and remove items to and from their shopping cart and proceed to checkout with ease.

A non-functional requirement would be that the system should process payments and payment information securely via ensuring data encryption during transactions

2. Describe how you would test those two requirements

To test the proposed functional requirement test cases should be created to verify that users can add multiple items to their cart, remove items from their cart, check the cart's content and also complete the checkout process easily. This would involve testing various item combinations and ensuring the total is correctly calculated. For instance, unit testing could be conducted for specific features (eg. Add item functionality - Ensuring you can add an item to the cart when it is empty, or for remove item functionality – if the cart has one item and it is removed ensure the cart is empty).

For the proposed non-functional requirement penetration testing should be conducted to ensure proper data encryption during the payment process. Load testing could also be employed to ensure that even when handling a high transaction volume the systems encryption still works effectively.

3. For the item counts in the shopping cart, describe what equivalence classes and boundary values you would choose when creating the corresponding unit tests

The equivalence classes and boundary values that I would choose for items in the shopping cart:

Equivalence Classes

- **Valid Class:** Number of Items between 1 and 100 (inclusive)
- **Invalid Class:** Number of Items is 0, or greater than or equal to 101

Boundary Values

- **Test Values:** 0 for empty cart, 1 for minimum acceptable cart value, 100 for maximum acceptable cart value, and 101 for first value to exceed limit

Part 2: Project Management (Risk Management) (6 marks):

1. Identify two risks associated with the development of that system

The main risk the development of this system proposes is inadequate security measures leading to potential data breaches. An additional risk would be integration issues with payment gateways that could delay the completion of the project.

2. Assess their probability and severity

Data breaches due to security vulnerabilities in system
Probability: Medium
Severity: Very high
Due to the nature of online transactions, cybercriminals may attempt gain access to your user's private and financial information for means of financial gain or to harm your business's reputation. The likelihood of this occurring is moderate although if an attacker is successful the damage can be detrimental, hence, the severity of this risk is very high.

Integration issues that delay the completion of project or cause other issues
Probability: High
Severity: Medium
Integrating new systems with other or external systems often presents some challenges and difficulty. This makes this risk more likely to occur, but not so detrimental, hence, the likelihood of this risk occurring is high but its severity is moderate.

3. Provide strategies to manage the risks

Data breaches due to security vulnerabilities in system
In order to mitigate this risk, security should be made a priority from the beginning via ensuring that security protocols are implemented, regular security audits are conducted, and that training concerning secure coding practices is provided to the developers of the system.

Integration issues that delay the completion of project or cause other issues
To mitigate this risk, a clear integration plan should be established with timelines including buffer time for troubleshooting, and early testing should be conducted with the payment gateway in order to identify issues sooner.

Part 3: Project Planning (3 marks):

1. Identify a possible milestone together with a related deliverable

A milestone from the system outlined in part 1 would be the completion of the shopping cart feature including both adding and removing an item from the cart as well as correctly calculating the total cost of the items in the cart. The deliverable related to this would be the fully functional shopping cart integrated with the payment processing system which would allow for transactions to be completed effectively using the shopping cart.

2. Describe how you would break down the milestone into at least two different tasks (see Project Management and Planning lecture in Week 10 for an example)

Task 1: Design Shopping Cart Architecture

- **Duration:** 10 days
- **Effort Estimate:** 5 person-days (2 designers working for 5 days)
- **Deadline:** Day 10 of the project
- **End-Point:** Delivery of design documents and user interface mockups for review

Task 2: Develop Shopping Cart Functionality

- **Duration:** 15 days
- **Effort Estimate:** 12 person-days (3 developers working for 5 days each, with additional time for integration)
- **Deadline:** Day 25 of the project
- **End-Point:** Successful completion of unit tests and integration testing