University of Victoria

University of Victoria
Midterm 3 PRACTICE QUESTIONS
Fall 2025

Student Name	
V-Number	
Section (CRN)	

Course Name & No.	CSC 360: Operating Systems
Instructor	Wenjun Yang
Duration	**70 Minutes**

- Coverage: all lectures including and after the topic of Locks. This is not an accumulative exam
- This real exam will have **8 questions**.
- This exam is to be answered on the paper provided.
- A basic calculator may be used, although you should not need to use one.
- This is a closed-book exam, but a one-page cheat sheet is allowed.
- The total number of marks in this exam is **100**.
- **Please bring your ONECard for the ID check**.
- **You will have 70 minutes to answer the 8 questions in the real exam**.

Part 1: Multiple Choice Questions (15 Marks)

For questions 1 to 5, check the box beside **all** answers that apply. Each question is worth three (3) marks. Selecting more or fewer than the required number of options will result in zero credit for the entire question.
Distribution: 5x3 marks.

Practice questions are omitted for this part. To prepare this part, I suggest you to review the lecture slides as well as the points we emphasized during the class.

Part 2: Written Answer Questions (85 Marks)

The following questions require written responses, unless otherwise noted. Point-form should be used where possible, providing your points accurately convey the idea behind your response.
Distribution: 30 + 25 + 30 marks.

Question 6: Virtual Memory Address Translation (30 Marks)

A certain paging system uses **16-bit logical addresses**, where the **high 6 bits** represent the page number and the **low 10 bits** represent the offset within the page.

a) Answer the following:

- i) How long is each address (in bits)?
- ii) How many logical addresses are possible?
- iii) What is the maximum logical address space for one process? (give answer in KB)

b) For the following logical addresses (in decimal), determine:

- The page number
- The offset within the page

Logical Address	Page Number	Offset
2318		
4096		
850		

Hint: Use the address translation formula:

- Page number = Logical address ÷ Page size (integer division)
- Page offset = Logical address mod Page size (remainder)
- Physical address = Frame number × Page size + Page offset

Question 7: Page Replacement Algorithms (25 Marks)

Given a page reference string, understand how to draw the page replacement diagram and calculate the page fault rate with algorithms such as FIFO, Optimal (AKA Belady algorithm), and LRU.

The practice question is omitted here.

Question 8: Disk Scheduling Algorithm Analysis (30 Marks)

Given pending I/O requests for cylinders (tracks), analyze

1. The order in which the cylinders will be serviced
2. The total number of cylinder movements (head movements)

when using different disk scheduling algorithms including: a) **FCFS** (First-Come, First-Served) b) **SSTF** (Shortest Seek Time First) c) **SCAN** (Elevator algorithm) d) **C-SCAN** (Circular SCAN)

Understand what is average seek time for one cylinder, what is rotational latency, what is data transfer time to read/write sectors, and how to calculate the total access time for one complete I/O operation. What additional system parameters needed to calculate these results?

Hints:

- Seek time = (number of cylinders traversed) × (time per cylinder)
- Rotational latency = (1 / (RPM / 60)) / 2 [average half rotation]
- Transfer time = (sectors to transfer / sectors per track) × (time for one rotation)
- Total access time = seek time + rotational latency + transfer time

END