SYSC 4001 Sample Midterm 2
Duration: 60 minutes
Instructor: T. Kunz

Name: **Student number:**

Question 1. Processes and Threads (10 marks)

a) Draw the process state model with 5 basic states plus support for swapping as discussed in class. Clearly label all relevant state transitions in the diagram.
b) Briefly describe the difference between a process and a thread.
c) What are the advantages of threads, compared to processes? What are the disadvantages?
d) What is the difference between kernel-level threads and user-level threads?

Question 2. Handling Deadlocks (10 marks)

Consider the following ways of handling deadlock: (1) banker's algorithm, (2) deadlock detect and kill thread, releasing all resources, (3) reserve all resources in advance, (4) restart thread and release all resources if thread needs to wait, (5) resource ordering, and (6) detect deadlock and roll back thread's application.

a) One criterion to use in evaluating different approaches to deadlock is as follows: Which permits the greater concurrency? In other words, which allows the most threads to make progress without waiting when there is no deadlock? Give a rank order from 1 to 6 for each of the listed ways of handling deadlock, where 1 allows for the greatest degree of concurrency. Comment on your ordering (e.g., why did you rank an approach at a certain level, compared to the other approaches).

b) Another criterion is efficiency; in other words, which requires the least processor overhead? Rank order the preceding approaches from 1 to 6, with 1 being the most efficient, assuming that deadlock is a very rare event and comment on your ordering. Does your ordering change if deadlocks occur frequently?

Question 3. Memory Management (10 marks)

a. Why is the capability to relocate processes desirable?
b. In a fixed-partitioning scheme, what are the advantages of using unequal-sized partitions?
c. What is the difference between internal and external fragmentation?
d. Explain the difference between simple paging and virtual memory paging.
e. What elements/entry are typically found in a page table entry for a virtual memory system based on paging? Briefly define each element.