

## CMPS111 Winter 2018

### Homework 2

Marks Available: **25 (5% of final course mark)**

Submission:

Due: **23:59 Wednesday January 31, 2018**  
Format: **Single PDF Document**  
Where: **Canvas**

**(6 Marks)** *Question 1.* Briefly outline the role of the Process Control Block (PCB), listing and describing three pieces of information an Operating System might choose to store in the PCB.

**(4 marks)** *Question 2.* Define the terms “race condition”, “deadlock”, and “starvation” as they relate to Operating System design and outline the relationship between deadlock and starvation.

**(4 marks)** *Question 3.* If we assume that when processes are interrupted they are placed in a queue containing all non-running processes not waiting for an I/O operation to complete, briefly describe two strategies the Operating System might adopt to service that queue. One-word answers will not suffice.

**(6 marks)** *Question 4.* Can the “priority inversion” problem outlined in section (3) of the background information to Lab 2 occur if user-level threads are used instead of kernel-level threads? Explain your answer.

**(5 marks)** *Question 5.* Describe a mechanism by which counting semaphores could be implemented using the minimal number of binary semaphores and ordinary machine instructions. Include C code snippets if you feel this will make your answer clearer and/or more concise.