University of California Santa Cruz
Baskin School of Engineering
Computer Science Department

CMPS111 Winter 2018

Homework 4

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

Submission:

Due:	**23:59 Wednesday February 21, 2018**
Format:	**Single PDF Document**
Where**:**	**Canvas**

(4 Marks) *Question 1.* For the following file operations, state whether an access control list or a capability list would be the more appropriate security mechanism. Explain your decisions.

(a) Granting read access for all users
(b) Revoking write access from all users
(c) Granting write access to three specific users
(d) Revoking execute access from four specific users

(6 Marks) *Question 2.* Processor A has separate memory caches for data and executable code; processor B has a single cache where it stores both data and executable code. (a) Which processor will leave an operating system running on it more susceptible to a buffer overflow attack? Explain your answer. (b) List and describe two ways an operating system might try to protect itself from buffer overflow attacks regardless of the processor on which it runs.

(4 Marks) *Question 3.* Consider a simple, non-paged memory management system in which memory consists of the following hole sizes in memory order: 10 MB, 4 MB, 20 MB, 18 MB, 7 MB, 9 MB, 12 MB, and 15 MB. Which hole is taken for successive segment requests of 12 MB, 10 MB, and 9 MB for (a) first fit (b) best fit (c) worst fit (d) next fit? Show all your work.

(3 Marks) *Question 4.* A computer with a 32-bit processor uses a two-level page lookup mechanism consisting of page tables and a page table directory. Virtual Addresses consist of a 9-bit page table directory field, an 11-bit page table field, and an offset. How large are the pages and how many are there in the address space? Show your work.

(8 Marks) *Question 5.* (a) Explain the difference between the terms *internal fragmentation* and *external fragmentation* as they relate to memory allocation. (b) Briefly outline the concept of paging. (c) Explain why paging is considered a better memory management technique than compaction. In all cases, draw diagrams if you feel this will make your answers clearer.