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

CMPS111 Winter 2018

Homework 1

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

Submission:

Due:	**23:59 Wednesday January 24, 2017**
Format:	**Single PDF Document**
Where**:**	**Canvas**

(5 marks) *Question 1.* Briefly outline the evolution of Operating Systems from the earliest stored program computers of the 1940s to their modern counterparts.

(5 marks) *Question 2.* In the following piece of C code, how many processes are created when it is executed? Explain your answer.

```
int main() {
    fork();
    fork();
    exit(1);
}
```

(5 marks) *Question 3.* If an Operating System assigns an unsigned 32bit integer to store current time as the number of seconds elapsed since 00:00 on January 1 1970, is this likely to be a problem? Explain your answer.

(5 marks) *Question 4.* Describe how a web server might leverage multi-threading to improve performance. Include diagrams if you feel this will make your answer clearer.

(5 marks) *Question 5.* (a) In a multiprogrammed environment with 16MB of memory where all processes require 1MB of unshared memory and spend 60% of their time in I/O wait, calculate how much memory will remain unused when approximately 99% CPU utilization is achieved. (b) In the same multiprogrammed environment, if each process now requires 3MB of unshared memory, calculate the maximum achievable CPU utilization. Show all your working.

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