CSCI-340: Operating Systems

Quiz 1 - Solution Key **10 Points**

Q1. [5 Points] Using the code snippet shown below, what would be displayed in the terminal assuming no errors occurred during the fork operations?

```
int a = 1;
int b = 2;
int c = 3;

if ( fork() == 0 ) {
      a += 5;
      printf("a=%d\n", a );
}

if ( fork() == 0 ) {
      b += 10;
      printf("b=%d\n", b);
      exit(0);
}

wait(0);
wait(0);
printf("c=%d\n", c );
```

b=12
a=6
b=12
c=3
c=3

Q2. [5 Points] Using the parent code snippet shown below and Figure 3.17, identify the sequence of states the parent process will step through. You may assume the time quantum is not exceeded, and I/O and wait operations will put the process asleep in memory.

```
char path[] = "/bin/echo"
char argv[] = { "echo", "q1", NULL };

if ( fork() == 0 ) {
      execv( path, argv );
}

wait(0);
printf("Finished\n");
```

1. **Initially in user mode state**
2. **Transition to kernel mode state (fork)**
3. **Transition to user mode state**
4. **Transition to kernel mode state (wait)**
5. **Transition to asleep in memory**
6. **Transition to ready to run in memory state**
7. **Transition to kernel mode state (context switch)**
8. **Transition to user mode state**
9. **Transition to kernel mode state (printf)**
10. **Transition to asleep in memory**
11. **Transition to ready to run in memory state**
12. **Transition to kernel mode state (context switch)**
13. **Transition to user mode state**
14. **Transition to kernel mode state**
15. **Transition to zombie state**