Midterm Questions

1. When a thread calls thread_yield(), which of the following can potentially be the new state of the thread after the execution of thread_yield() returns?
   ____ Waiting
   ____ Ready
   ____ Running
2. Which of the following statements are true in describing the various data structures that can be used for synchronization?

____ V() operation on a semaphore will awake all waiting threads

____ signal() on a condition variable cannot impact future calls to wait()

____ Implementation of lock that uses test-and-set only works on a uniprocessor system
Midterm Questions

3. Which of the following cases are examples of architectural support for operating systems?
   ___ Test-and-Set instruction
   ___ CPU privileges (e.g., Ring 0 and Ring 3)
   ___ Timer interrupt
4. Which of the following scheduling algorithms may cause starvation?
   ____ First Come First Serve
   ____ Shortest Job First
   ____ Multi-level Feedback Queue with reset
5. Which of the following statements about deadlock is correct?

_____ If there is a circle in the resource allocation graph, then there must be a deadlock

_____ Deadlock can be prevented by imposing and acquiring resources in a order

_____ Deadlock can be avoided via scheduling
Midterm Questions

```c
int main() {
    int pid1=0, pid2=0;
    int count = 1;

    pid1 = fork();

    if(!pid1) {
        pid2=fork();
        count++;
    }

    if (pid1==pid2) {
        printf("%d \n", count);
    } else {
        printf("%d \n", count+3);
    }

    // For part C, consider what would happen if the following statement is uncommented:
    // if(pid2) waitpid(pid2, status, NULL);

    printf("%d \n",count);
}
```
Midterm Questions

* Job J1 arrives at time $t=0$ and has a runtime of 6 sec
* Job J2 arrives at time $t=2$ and has a runtime of 3 sec
* Job J3 arrives at time $t=6$ and has a runtime of 2 sec

On a machine with one CPU, draw the timeline of execution of these jobs for the following implementations of a scheduler: (A) non-preemptive shortest job first, (B) preemptive shortest job first, (C) round robin with a quantum of 1 second. Compute the average waiting time in each case.
Midterm Questions
Midterm Questions

1: semaphore wmutex = 1, rmutex = 1;
2: integer num_readers = 0;
3: Read() {
4:    wait(rmutex);
5:    if (num_readers == 0)
6:        wait(wmutex);
7:    num_readers += 1;
8:    signal(rmutex);
9:    Perform read;
10:   wait(rmutex);
11:   num_readers -= 1;
12:   if (num_readers == 0)
13:       signal(wmutex)
14:       signal(rmutex);
15: }

Write() {
    wait(wmutex);
    Perform write;
    signal(wmutex);
}
Additional

- Watch this year's Turing Lecture
  - https://www.acm.org/hennessy-patterson-turing-lecture