CS341#20 - CSP II. Race Conditions. Deadlock II and Dining Philosophers

1. *Condition Variables (Code Review)*

Is it necessary for the `change` method to lock the mutex, to release a blocked thread? Why is ‘if” incorrect?

```
void change() {
  x = 1;
  pthread_cond_signal(&cv);
}
```

```
void wait_for_positive_x() {
  pthread_mutex_lock(&m);
  if(x < 1)
     pthread_cond_wait(&cv, &m);

  pthread_mutex_unlock(&m);
}
```

... Implications for cond_wait implementation?

2. *What is Livelock?*

3. *Deadlock conditions*

3. Deadlock

The _________________________________ conditions for deadlock are:

__________________________________: "A process is currently holding at least one resource and requesting additional resources which are being held by other processes."

__________________________________:"There is a set of waiting processes, such that P_1 is waiting for a resource held by P_2, P_2 is waiting for a resource held by P_3 and so on until P_N is waiting for a resource held by P_1."

__________________________________:"A resource can be released only voluntarily by the process holding it, after that process has completed its task"

__________________________________:"At least one resource must be held in a non-shareable mode"

4. *Deadlock (applied)*

Three gardeners visit the garden shed pick up their desired tools for the day. There is a potential for deadlock. Fortunately they know about the C________________ conditions! Find four ways to solve the problem (break one condition each time). Name which condition you break in each case.

1

2

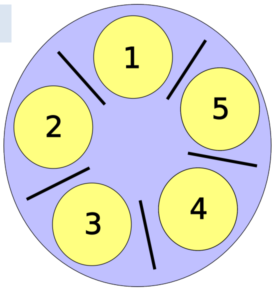
3

4

5. *Think concurrently!*

Remember (for example) Mergesort? How can you implement parallel Mergesort? Explain what synchronization calls you will use and when.

6. *What is the "Dining Philosophers" problem?*



Candidate Solutions:
1. "Pick up left chopstick. Pickup right chopstick. Eat. Release both."

2. "Pick up right. Pick up left. Eat. Release both"

3. "Eat when I tell you"

4. "Pick up left chopstick. Try to pickup right chopstick (Fail? release both and restart). Eat. Release both."

5?