

*On my honor, I/we have not given, nor received,
nor witnessed any unauthorized assistance on this work.*

Name/Signature: _____

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Question:	1	2	Total
Points:	15	40	55
Score:			

1. Some of the following arrangements of threads and locks they acquire can lead to deadlock. For each scenario, state whether or not it can lead to deadlock. If it can lead to deadlock, draw a diagram showing the deadlock similar to figure 32.7 in the textbook.

- (a) (3 points) Thread 1 will try to grab locks 1 and 2 in an arbitrary order. Thread 2 will try to grab lock 1 first, and then 2.

- (b) (3 points) Thread 1 will first try to grab lock 1 and then lock 2. Thread 2 will try to grab lock 2 and then lock 1.

- (c) (3 points) Thread 1 will try to grab lock 1 first and then lock 2. Thread 2 will try to grab first lock 1, then lock 2, and then lock 3.

- (d) (3 points) Thread 1 will try to grab locks 1 and 2 in an arbitrary order. Thread 2 will try to grab locks 2 and 3 in an arbitrary order. Thread 3 will try to grab locks 1 and 3 in an arbitrary order.

- (e) (3 points) Based on the examples above, explain why **total ordering** (acquiring locks in a set order) is considered a solution to the problem of deadlock.

2. (40 points) Dr. Myers demonstrated his heretofore unknown talents as a playwright by helpfully dramatizing the classic “Dining Philosophers” to demonstrate deadlock. Your team must now step up to the challenge and dramatize another classic example of deadlock, “The Producer-Consumer Problem” (also known as the “Bounded Buffer Problem”). For full credit, your play should clearly demonstrate the synchronization problems that can occur (as Dr. Myers’s play does). However, you do not need to demonstrate how to use synchronization primitives to **solve** the problems. Be creative.