1). Describe the asymmetric solution. How does the asymmetric solution guarantee the philosophers never enter a deadlocked state?

Asymmetric solution makes sure even numbered philosophers pick up left chopsticks first then right, and the odd numbered philosophers pick up right chopsticks first then left.

2).Does the asymmetric solution prevent starvation? Explain.

No, asymmetric solution cannot prevent starvation. Because the thinking and eating period is very random, picking up chopsticks for philosophers is random as well, so ideally, no philosopher should starve, however, if a set of philosophers ever began to share the same “rhythm” then one philosopher might be at a disadvantage which will lead to starving.

3).Describe the waiter's solution. How does the waiter's solution guarantee the philosophers never enter a deadlocked state?

Waiter will give philosophers a chopstick to make a pair if they do not have one pair already. It locks when a philosopher wants chopsticks and unlocked whenever a philosopher has a complete pair of chopsticks and is available to eat. Once it unlocks the waiter mutex, send a signal to its neighboring philosophers that they can retry to take chopsticks.

4).Does the waiter's solution prevent starvation? Explain.

No, the waiter solution does not prevent starvation. One philosopher can eat and reclaim , so the waiter mutex will be locked and unlocked over and over, and other philosophers cannot take chopsticks.

5).Consider a scenario under a condition variable based solution where a philosopher determines at the time it frees its chopsticks that both chopsticks of another philosopher (Phil) it shares with are free, and so it sends the (possibly) waiting Phil a signal. Under what circumstances may Phil find that both of its chopsticks are NOT free when it checks?

The Phil will find the chopsticks he want are taken after he receive the signal from one of his neighbor has managed to take the chopstick between time he receive the signal and check if they are available or not