

1.

1.1. P1: $x = x - 1 \Rightarrow x = 9$
P2: $x = x - 1 \Rightarrow x = 8$
P1: $x = x + 1 \Rightarrow x = 9$
P1 into if statement
P2: $x = x + 1 \Rightarrow x = 10$
P1: "x is 10"

1.2. P1: LD R0, X $\Rightarrow x = 10$
P1: DEC R0 $\Rightarrow x = 9$
P2: LD R0, X $\Rightarrow x = 9$
P2: DEC R0 $\Rightarrow x = 8$
P1 into if statement
P1: "x is 8"

2. Binary semaphores are easier to implement and are restricted to only having 0 and 1. General semaphores, also called counting semaphores, have a variable k whose value is equal to the number of items in the buffer.
3. A monitor consists of a lock and condition variables. It allows a semaphore to have mutual exclusion and the ability to block due to a condition becoming true. Monitors can also signal other threads that their condition has been met.
4. Two operations can be performed on semaphores: wait and signal. Wait is a locking mechanism and signal/acquire is an unlocking mechanism. When the semaphore is locked, it is not accessible, and when it is unlocked, it is accessible to users.