Question 1:

Pthread_cond_wait() is used to wait for a condition, blocking until a specific condition is met. It will do two things, release the associated mutex, then it blocks threads until signaled to unlock. It just waits for resources or items to be available. The reason Mutex becomes unlocked is because if another thread needs the resources, we do not want deadlock.

Question 2:

There are two different situations that can occur, a blocking one, where the queue is full, the task will be put on wait, until room becomes available. Then in non-blocking (no wait), if the queue is full there would be an error returned, saying no room.

Question 3:

Both the mq1 and mq2 have a capacity of mq_maxmsg >= 2. Task 1 will send two messages then will wait to receive a message. Task 2 then will send one message and wait to receive two messages. Since it is only two messages sent from T1 to the queue for mq2, then we know it will be sent, and wait will not occur. Then we know Task 2 only sends one message, so we know no wait as well. Both tasks complete what is required, creating a smooth transition. There would be issues if too many messages were sent, because it could cause a deadlock, because we would need to wait, but since we do not see it here, we are fine. Also order also matters, we should always send before receiving.