RA2 Solution:

Question 1:

Part (a): What will the `nextIndex` values be for nodes Y and Z right after Node X becomes the leader?

Answer: `nextIndex[Y]` and `nextIndex[Z]` will both be initialized to 11 (the leader's last log index + 1).

Part (b): After successfully replicating a log entry with index 11 to Node Y, what will the `nextIndex` and `matchIndex` values be for Node Y?

Answer: After a successful replication, `nextIndex[Y]` will be updated to 12, and `matchIndex[Y]` will be updated to 11.

Part (c): Now, suppose that when Node X tries to replicate an entry at index 11 to Node Z, it fails because Node Z's log ends at index 8.

What will happen to `nextIndex` for Node Z after the failure?

Answer: `nextIndex[Z]` will be decremented to 10.

How will Node X adjust `nextIndex` and eventually synchronize logs?

Answer: Node X will continue decrementing `nextIndex[Z]` until it finds a matching log entry between X and Z. Once the matching index is found, Node X will send the remaining entries to synchronize Z's log with the leader's log.

Question 2:

Node Q will accept the `AppendEntries` request.

The term in the request (5) is greater than Node Q's current term (4). As a result, Node Q updates its term to 5. Since the `prevLogIndex` (3) and `prevLogTerm` (4) match Q's log, the request is considered valid, and the entries will be appended successfully.