Q1 a) Consider a toy example below. This is fed as input to the mapper function.

Src	Tgt	weight
299	51	1
117	51	1
194	51	3
194	151	51
230	151	79
51	130	10

1.The input is fed into the mapper function. The function converts the input terms into a string and split at the tab space. The target node is mapped to the weight and the source node is mapped to email. Below table represents the output to the mapper function.

Key	Value
51	1
51	1
51	3
151	51
151	79
130	10

2. The output of the mapper function is then fed as input to the reducer function. The reducer function then combines all the values from the same KEY. The reducer function reduces entries from the same KEY to one entry and maps it to the maximum VALUE for that KEY. Below is the final output for the map-reduce.

Key	Value
51	3
151	79
130	10

Q1b)

1. 1.The input is fed into the mapper function. The function converts the input terms into a string and split at the tab space. The target node is mapped to the weight and the source node is mapped to email. Below table represents the output to the mapper function.
2. The output of the mapper function is then fed to the composite key function where the composite key is created based on the three columns i.e. sender, receiver and weight.

3. The Composite Key is then used to sort the nodes by node ID of the receiver (ascending), second by weight (descending), and lastly by node ID of the sender (ascending).
4. The reducer function is used to do this sorting.