Assignment 1

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1. Solution:

   False. Counterexample:

M1	W2	W1
M2	W1	W2

W1	M1	M2
W2	M2	M1

We can easily see that we have a stable matching: (M1,W2), (M2,W1) , which is a counterexample.

2. Solution:

   Ture. Explanation: because GS algorithm make sure that if m likes w most and w likes m most then (m, w) must be a couple in every stable matching S.

3.Solution:

Algorithm:

Initially all s∈S and t∈T are free

While there is a show s or t do not have a time slot

Choose such a show s or t ,name it as p

Let q is the slot in which p has the highest rating

If q is free then

(p, q) is settled

Else q is booked by p'

If p' has higher rating than p

p still does not have a time slot

Else p has higher rating than p'

(p, q) is settled

p' lost this time slot

End if

End if

End while

Return (S,T)

8.Solution:

Assume we have three men m1 to m3 and three women w1 to w3. (column w3’ pretends to prefer m3 to m1)

M1	M2	M3	W1	W2	W3	W3’
W3	W1	W3	M1	M1	M2	M2
W1	W3	W1	M2	M2	M1	M3
W2	W2	W2	M3	M3	M3	M1

One possibility of GS algorithm with the ture preference list of w3: (m1,w3), (m2,w1), (m3,w2).Thus paring w3 with m1, who is her second choice.

Then we consider execution of the GS algorithm when w3 pretends she prefers m3 to m1.

Thus m1 proposes to w3, m2 to w1, then m3 to w3. She accepts the proposal, leaving m1 alone. Then m1 proposes to w1 which causes w1 to leave her current partner m2, who consequently proposes to w3. Finally, the algorithm pairs up m3 and w2. As we see, w3 ends up with the man m2, who is her true favorite. Thus we conclude that by falsely

switching order of her preferences, a woman may be able to get a more desirable partner in the GS algorithm.