

**Assignment #1****SID: 11812103****Name: ZHANG Wenhao***Chapter 1 Exercise 1, 2, 3***Ex 1 False.**

Suppose 1, 2 are men and 3, 4 are women, and the order of their preference is:

	1st	2nd
1	3	4
2	4	3
3	2	1
4	1	2

Then we can easily find that for any human, the people he/she prefers first doesn't prefer her first, and then we can say that *there are no stable matchings containing a pair  $(m, w)$  such that  $m$  is ranked first on the preference list of  $w$  and  $w$  is ranked first on the preference list of  $m$ .*

**Ex 2 True.**

Assume the proposition is false, which means there is a matching that doesn't contains  $(m, w)$ , then it is not a stable matching since it will leads  $m$  and  $w$  be unstable.

**Ex 3 (b).**

Suppose  $n = 2$  and the associated ratings of  $\mathcal{A}$ 's TV shows are 1, 3 and those of  $\mathcal{B}$ 's TV shows are 2, 4.

One possible situation is  $S = (1, 3)$  and  $T = (2, 4)$  (or equivalently  $S = (3, 1)$  and  $T = (4, 2)$ ), in which case  $\mathcal{A}$  can change  $S$  to  $(3, 1)$  to win more slots.

Another possible situation is  $S = (1, 3)$  and  $T = (4, 2)$  (or equivalently  $S = (3, 1)$  and  $T = (2, 4)$ ), in which case  $\mathcal{B}$  can change  $T$  to  $(2, 4)$  to win more slots.

As mentioned above, there is no stable pair of schedules in the given associated ratings.