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a)

b) True, since if eac man propose to his top three women in order in a worst case scenario the number of total proposal in the set is given by total proposal <= 3n which in tuen means that big O time is O(n)

c) False, since if f(n)=n and g(n)=1, then g(n)=O(n^2) holds but f(n)=n does not hold for O(g(n))=O(1)

d)

Four possible choices/scenarios:

For men:

M1: w1>w2 or w2>w1

M2: w1>w2 or w2>w1

For women:

W1: m1>m2 or m2>m1

W2: m1>m2 or m2>m1

Instances:

1. m1: w1>w2, m2: w1>w2; w1: m1>m2, w2: m1>m2

2. m1: w1>w2, m2: w1>w2; w1: m1>m2, w2: m2>m1

3. m1: w1>w2, m2: w1>w2; w1: m2>m1, w2: m1>m2

4. m1: w1>w2, m2: w1>w2; w1: m2>m1, w2: m2>m1

5. m1: w1>w2, m2: w2>w1; w1: m1>m2, w2: m1>m2

6. m1: w1>w2, m2: w2>w1; w1: m1>m2, w2: m2>m1

7. m1: w1>w2, m2: w2>w1; w1: m2>m1, w2: m1>m2

8. m1: w1>w2, m2: w2>w1; w1: m2>m1, w2: m2>m1

9. m1: w2>w1, m2: w1>w2; w1: m1>m2, w2: m1>m2

10. m1: w2>w1, m2: w1>w2; w1: m1>m2, w2: m2>m1

11. m1: w2>w1, m2: w1>w2; w1: m2>m1, w2: m1>m2

12. m1: w2>w1, m2: w1>w2; w1: m2>m1, w2: m2>m1

13. m1: w2>w1, m2: w2>w1; w1: m1>m2, w2: m1>m2

14. m1: w2>w1, m2: w2>w1; w1: m1>m2, w2: m2>m1

15. m1: w2>w1, m2: w2>w1; w1: m2>m1, w2: m1>m2

16. m1: w2>w1, m2: w2>w1; w1: m2>m1, w2: m2>m1