

Members: Gabriel Reisen

a)

$$(\log n)^2 < n(\log n)^{1001} < n^{1.0001} < n^4(\log n)^{100000} < n^5 < n^{100000000} < (1.001)^n < 2^n$$

b) True, since if each man proposes to his top three women in order in a worst case scenario the number of total proposals in the set is given by total proposals $\leq 3n$ which in turn 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: $w_1 > w_2$ or $w_2 > w_1$

M2: $w_1 > w_2$ or $w_2 > w_1$

For women:

W1: $m_1 > m_2$ or $m_2 > m_1$

W2: $m_1 > m_2$ or $m_2 > m_1$

Instances:

1. $m_1: w_1 > w_2, m_2: w_1 > w_2; w_1: m_1 > m_2, w_2: m_1 > m_2$
2. $m_1: w_1 > w_2, m_2: w_1 > w_2; w_1: m_1 > m_2, w_2: m_2 > m_1$
3. $m_1: w_1 > w_2, m_2: w_1 > w_2; w_1: m_2 > m_1, w_2: m_1 > m_2$
4. $m_1: w_1 > w_2, m_2: w_1 > w_2; w_1: m_2 > m_1, w_2: m_2 > m_1$
5. $m_1: w_1 > w_2, m_2: w_2 > w_1; w_1: m_1 > m_2, w_2: m_1 > m_2$
6. $m_1: w_1 > w_2, m_2: w_2 > w_1; w_1: m_1 > m_2, w_2: m_2 > m_1$
7. $m_1: w_1 > w_2, m_2: w_2 > w_1; w_1: m_2 > m_1, w_2: m_1 > m_2$
8. $m_1: w_1 > w_2, m_2: w_2 > w_1; w_1: m_2 > m_1, w_2: m_2 > m_1$
9. $m_1: w_2 > w_1, m_2: w_1 > w_2; w_1: m_1 > m_2, w_2: m_1 > m_2$
10. $m_1: w_2 > w_1, m_2: w_1 > w_2; w_1: m_1 > m_2, w_2: m_2 > m_1$
11. $m_1: w_2 > w_1, m_2: w_1 > w_2; w_1: m_2 > m_1, w_2: m_1 > m_2$
12. $m_1: w_2 > w_1, m_2: w_1 > w_2; w_1: m_2 > m_1, w_2: m_2 > m_1$
13. $m_1: w_2 > w_1, m_2: w_2 > w_1; w_1: m_1 > m_2, w_2: m_1 > m_2$
14. $m_1: w_2 > w_1, m_2: w_2 > w_1; w_1: m_1 > m_2, w_2: m_2 > m_1$
15. $m_1: w_2 > w_1, m_2: w_2 > w_1; w_1: m_2 > m_1, w_2: m_1 > m_2$
16. $m_1: w_2 > w_1, m_2: w_2 > w_1; w_1: m_2 > m_1, w_2: m_2 > m_1$