1. u, u, u, n, s, a, l

subset : ${}_4C_4$ (1u) + ${}_4C_3$ (2u) + ${}_4C_2$ (3u) = 1 + 4 + 6 = 11

string : ${}_5P_5$ (1u) + $\frac{{}_5P_5}{{}_2P_2}$ (2u) + $\frac{{}_5P_5}{{}_3P_3}$ (3u) = 120 + $\frac{120}{2}$ + $\frac{120}{6}$ = 200

2. ${}_3C_2 \times {}_4C_2 \times {}_4C_2 \times {}_4C_1$

$= 78 \times 6 \times 6 \times 44 =$ 123552

3. i) fighting couple : 0 song : 16 left for 6 cps

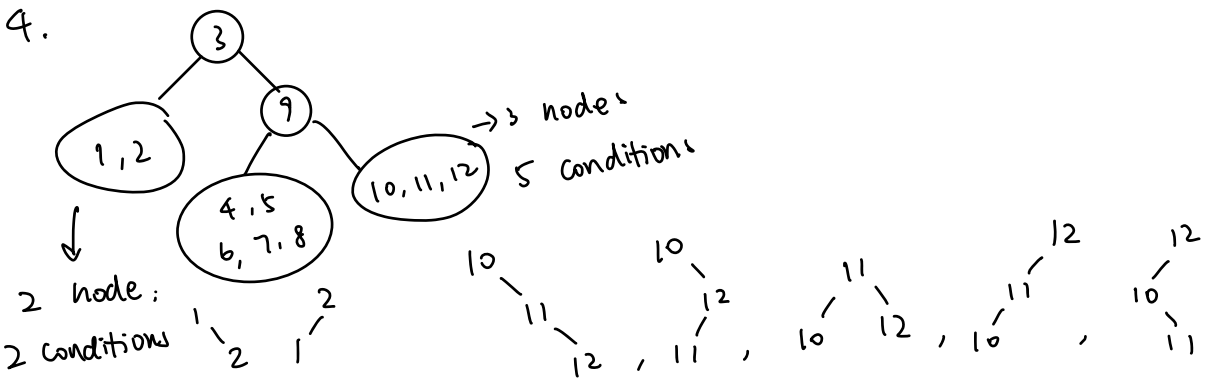
${}_{6+16-1}C_{16} = {}_{21}C_{16} =$ 20349

ii) fighting couple : 1 song : 15 left for 6 cps

${}_{6+15-1}C_{15} = {}_{20}C_{15} =$ 15504

$\Rightarrow {}_{21}C_{16} + {}_{20}C_{15} =$ 35853

4.



4 nodes : A < B < C < D

A — BCD : 5 cond

B — A, CD : 2 cond

C — AB, D : 2 cond

D — ABC : 5 cond

$\Rightarrow$ 14 cond

5 nodes : A < B < C < D < E

A — BCDE : 14 cond

B — A, CDE : 5 cond

C — AB, DE : 2 × 2 = 4 cond

D — ABC, E : 5 cond

E — ABCD : 14 cond

$\Rightarrow$ 42 cond

$2 \times 42 \times 5 =$ 420 ways

5. 10 friends 4 nurses

(1, 1, 1, 7) (2, 2, 1, 5)
(1, 1, 2, 6) (2, 2, 2, 4)
(1, 1, 3, 5) (2, 2, 3, 3)
(1, 1, 4, 4)
(1, 2, 3, 4)
(1, 3, 3, 3)

9

10 friends 3 nurses

(1, 1, 8) (2, 2, 6) (3, 3, 4)
(1, 2, 7) (2, 3, 5)
(1, 3, 6) (2, 4, 4)
(1, 4, 5)

8

9 + 8 = 17