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

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

string: ${}_5P_5 + \frac{{}_5P_5}{{}_2P_2} \times {}_4C_3 + \frac{{}_5P_5}{{}_3P_3} \times {}_4C_2 = 120 + 4 \times \frac{120}{2} + 6 \times \frac{120}{6} = 480$ (1u, 2u, 3u)

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

$= 78 \times 6 \times 6 \times 4 = 11232$

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

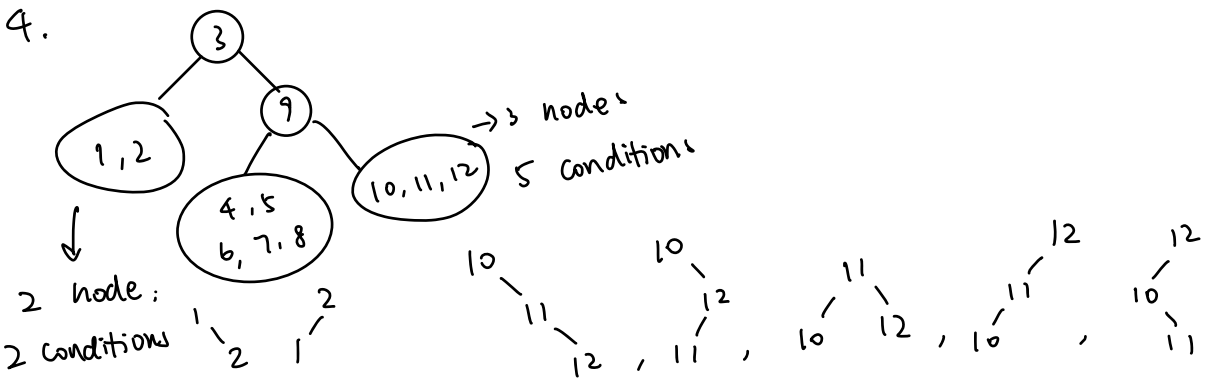
${}_{6+16-1}C_{16} = {}_{21}C_{16} = 2034$

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: $2 \times 2 = 4$ 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