

1.) 1 fixed U + 2 fixed U + 3 fixed U

$$\binom{4}{4} + \binom{4}{3} + \binom{4}{2}$$

$$1 + 4 + 6 = 11 \text{ subsets}$$

$$\frac{5!}{1!} \binom{4}{4} + \frac{5!}{2!} \binom{4}{3} + \frac{5!}{3!} \binom{4}{2}$$

$$5! + 4 \cdot 5 \cdot 4 \cdot 3 + 6 \cdot 5 \cdot 4 =$$

$$120 + 240 + 120 = 480 \text{ strings}$$

pick 2 diff values from 13

1st pair

2nd pair

5th card

2.) $\binom{13}{2} \cdot \binom{4}{2} \cdot \binom{4}{2} \cdot \binom{44}{1}$

$$\frac{13!}{2! 11!} \cdot \frac{4!}{2! 2!} \cdot \frac{4!}{2! 2!} \cdot \frac{44!}{43!}$$

$$78 \cdot 6 \cdot 6 \cdot 44 = 123552 \text{ ways}$$

3.) 16 songs in hour for 7 couples

6 songs + 1 song

$$\binom{16}{5} + \binom{15}{5}$$

$$\frac{16!}{5! 11!} + \frac{15!}{5! 10!}$$

$$\frac{16 \cdot 15 \cdot 14 \cdot 13 \cdot 12}{5 \cdot 4 \cdot 3 \cdot 2} + \frac{15 \cdot 14 \cdot 13 \cdot 12 \cdot 11}{5 \cdot 4 \cdot 3 \cdot 2}$$

$$\frac{524160}{120} + \frac{360360}{120}$$

$$4368 + 3003 = 7371 \text{ ways}$$

4.)

2 nodes

2 ways

$$1 + 1 = 2$$

3 nodes

5 ways

$$2 + 2 + 1 = 5$$

4 nodes

14 ways

$$5 + 5 + 2 + 2 = 14$$

5 nodes

42 ways

$$14 + 14 + 5 + 5 + 2 + 2 = 42$$

$$2 \cdot 5 \cdot 42 = 420 \text{ ways}$$

5.) 4 nurses

	7	6	5	5	4	4	4	3	3
A	1	2	3	2	4	3	2	3	3
B	1	1	1	2	1	2	2	2	3
C	1	1	1	1	1	1	2	2	1

9 combos

3 nurses

	8	7	6	6	5	5	4	4
A	1	2	3	2	4	3	4	3
B	1	1	1	2	1	2	2	3
C	1	1	1	1	1	1	2	2

8 combos

$$9 + 8 = 17 \text{ combos}$$