1.) UNUSUAL

Only one Unique $\{A, L, N, S, U\}$
subset of the 5 letters

So, We could have

$$\overline{5} \ \overline{4} \ \overline{3} \ \overline{2} \ \overline{1}$$ options

Which is $5!$, 120

So, only one unique subset can be formed
120 diff. strings could be made

2.) 52 cards   4 suits

13 denominations / suit

$$\underbrace{\underset{?}{\rule{1cm}{0.4pt}} \quad \underset{?}{\rule{1cm}{0.4pt}}}_{} \quad \overset{*}{\rule{1cm}{0.4pt}} \quad \overset{*}{\rule{1cm}{0.4pt}} \quad \rule{1cm}{0.4pt}$$

Choose 2 diff denominations : $13C2$
Choose 2 cards from each: $4C2, 4C2$
Choose 1 card from diff group : $44C1$

Total : $13C2 \cdot 4C2 \cdot 4C2 \cdot 44C1$

$= 78 \cdot 6 \cdot 6 \cdot 44$

$= 123,552$ ways.

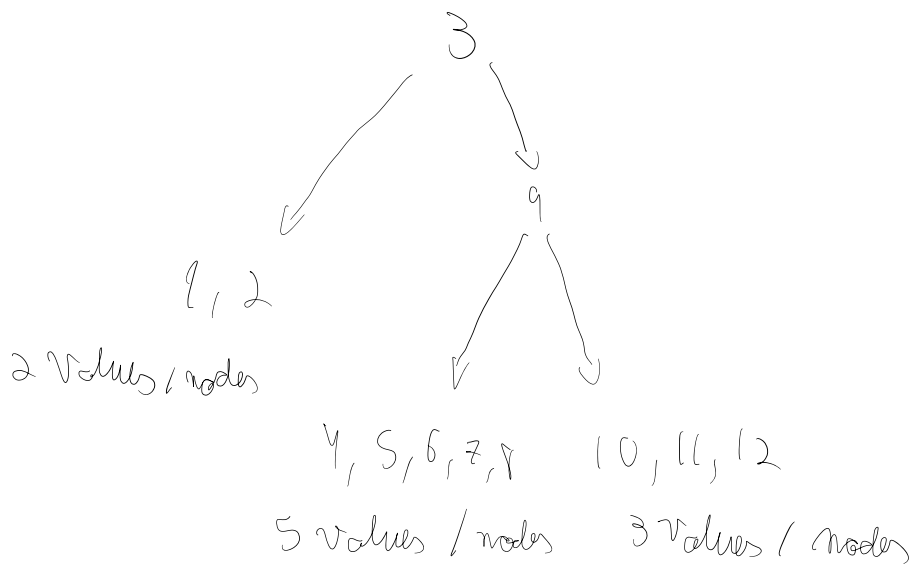3.)   16 songs   Condition: One couple is having

                               a fight and will allow

          7 couples   at most 1 song to be

                               played to them before

16 songs for 7 couples   they ask the violist

                             not to return to their table

Ways: $16C1 \cdot 15C6$

$$\Rightarrow \frac{16!}{1! \cdot (16-1)!} \cdot \frac{15!}{6! \cdot (15-6)!}$$

= 80,080 Ways The songs can be distributed

amongst the couples.

4.)   12   nodes

Root → 3
RC → 9

$$3$$

3
↙ ↘
    9
   ↙ ↘

1, 2
2 values / nodes

4, 5, 6, 7, 8   10, 11, 12
5 values / nodes   3 values / nodes

$$n \Rightarrow \frac{2n\,C_n}{n+1}$$

$$\frac{4\,C\,2}{2+1} \cdot \frac{10\,C\,5}{5+1} \cdot \frac{6\,C\,3}{3+1}$$

$$= 2 \cdot 42 \cdot 5$$
$$= 420 \; BSTs \; //$$

5.)

10 patients assigned : $10C1 = 10$

4 Id. nurses : $4C1 = 4$

1 of the Nurses may be scheduled : $10C4 = 10 \cdot 3 \cdot 7$ Minutes

for a break

diff Combination for # of patients served
by Nurses

$$\Rightarrow 10 \, P \, 4 = \frac{10!}{(10-4)!}$$

$$= 10 \cdot 9 \cdot 8 \cdot 7$$
$$= 5040 \text{ Combination } //$$