

Counting

1. Unusual

3 v's

Subset:

$$\begin{array}{l} \underline{v} \quad \quad \quad \quad \quad \quad \quad 4C_4 + 4C_3 + 4C_2 \\ \underline{v} \quad \underline{v} \quad \quad \quad \quad \quad = 1 + 4 + 6 = \boxed{11 \text{ Subsets}} \\ \underline{v} \quad \underline{v} \quad \underline{v} \quad \quad \quad \end{array}$$

Strings:

$$\frac{5!}{1!} + 4C_3 \left(\frac{5!}{2!} \right) + 4C_2 \left(\frac{5!}{3!} \right)$$

$$= 120 + 4(60) + 6(20)$$

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

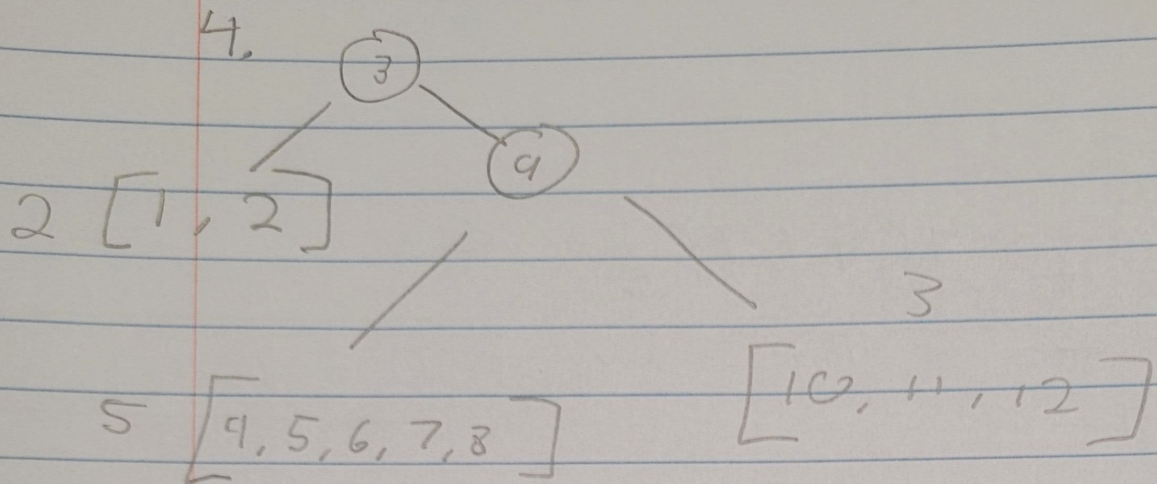
2.

$$\begin{array}{c} 13C_2 \cdot 4C_2 \cdot 4C_2 \cdot 44 \\ \downarrow \quad \quad \quad \downarrow \quad \quad \quad \uparrow \\ 2 \text{ out of } 13 \quad 2 \text{ suits} \quad 44 \text{ cards left} \end{array}$$

$$= \frac{13!}{11! 2!} \cdot 6 \cdot 6 \cdot 44 = \boxed{123,552 \text{ hands}}$$

3. 16 songs
7 couples

$$\begin{array}{l} 0: 16C_5 = 4,368 \\ 1: 15C_5 = 3,003 \end{array} \Rightarrow \boxed{7,371 \text{ ways}}$$



$$\frac{4C2}{3} = 2$$

$$\frac{8C3}{4} = 5$$

$$\frac{10C5}{6} = 42$$

$$\frac{5 \cdot 10 \cdot 42}{1} = 420 \text{ ways}$$

5.

4:

1	7	6	5	5	4	4	4	3	3
2	1	2	3	2	4	2	3	3	3
3	1	1	1	2	1	2	2	2	3
4	1	1	1	1	1	2	1	2	1

3:

8	7	6	6	5	5	4	4
1	2	3	2	3	4	4	4
1	1	1	2	2	1	2	3

8

$$9 + 8 = 17$$