

Show your work please.

1. How many 3-permutations are there of a, b, c, d?

$$P_3^4 = \frac{4!}{(4-3)!} = \frac{4!}{1!} = \frac{4 \times 3 \times 2 \times 1}{1} = 24$$

2. A club consists of six distinct men and seven distinct women. In how many ways can we select a committee of three men and four women?

$$C_3^6 \times C_4^7 = 20 \times 35 = 700$$

3. A club consists of six distinct men and seven distinct women. In how many ways can we select a committee of four persons that has **at least one woman**?

$$C_4^{13} - C_4^6 = 715 - 15 = 700$$

*That is, all possible cases – all men for committee*

4. A club consists of six distinct men and seven distinct women. In how many ways can we select a committee of four persons that has at most one man?

$$C_4^7 + C_1^6 \times C_3^7 = 35 + 6 \times 35 = 245$$

*That is, no man in committee + 1 man in committee*

5. Two dice are rolled, one blue and one red. How many outcomes give the sum of 7 or the sum of 11?

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

*In total, there are 8 outcomes.*

6. Two dice are rolled, one blue and one red. How many outcomes have at least one die showing 2?

$$\text{Only red die in 2 (5 cases) + Only blue die in 2 (5 cases) + both in 2 (1 case) = } 5+5+1=11$$

7. How many eight-bit strings begin and end with 1?

$$2^6 = 64$$

8. How many eight-bit strings have exactly two 1's?

$$C_2^8 = 28$$

9. A six-person committee composed of Alice, Ben, Connie, Dolph, Egbert, and Francisco is to select a chairperson, secretary, and treasurer. How many selections are there in which Dolph is an officer and Francisco is not an office?

*Dolph can be any of three officers. The rest two positions will be selected from the rest 4 people (Take Dolph and Francisco out).*

$$3 \times P_2^4 = 3 \times 12 = 36$$

10. A six-person committee composed of Alice, Ben, Connie, Dolph, Egbert, and Francisco is to select a chairperson, secretary, and treasurer. How many selections are there in which Ben is either chairperson or treasurer?

$$2 \times P_2^5 = 2 \times 20 = 40$$