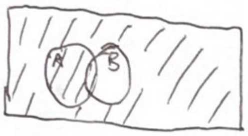
Week 3 Handout Rubric.

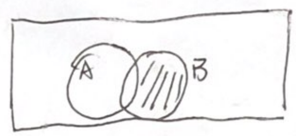
Let $(\cdot,\cdot)$ denote possible sample points. $\Omega = \{(i,j),\ i,j=1,2\cdots 6\}$ sample space.

$A = \{(1,6),(2,5),(3,4),(4,3),(5,2),(6,1)\}$

$B = \{(1,6),(2,3),(3,2),(6,1)\}$

$A \cap B = A \text{ and } B = \{(1,6),(6,1)\}$

2. 

3. 

4. "Side-by-side" $\Rightarrow$ permutation $\quad {}_9P_4 = \frac{9!}{5!} = 3024$

5. We have ${}_3P_3 = 6$ ways to determine the order of 3 artists in a row

(e.g. $\underset{\text{Van Gogh}}{2}$ $\underset{\text{Picasso}}{5}$ $\underset{\text{Monet}}{3}$ or $\underset{\text{Picasso}}{5}$ $\underset{\text{Monet}}{3}$ $\underset{\text{Van Gogh}}{2}$ so on ...)

For each artist, we then calculation the permutation of its paintings:

$${}_2P_2 \cdot {}_5P_5 \cdot {}_3P_3 = 1440$$

$\Rightarrow$ Together we have $6 \times 1440 = 8640$ ways

6. □□□ in a sequence, each cell has 40 possibilities.

Together $40 \times 40 \times 40 = 64000$

7. It's equivalent to say ${}_{40}P_3$ (Since in a sequence, we need to consider the order of each number)

$${}_{40}P_3 = 40 \times 39 \times 38 = 59280$$

8. It's combination question. ${}_{52}C_5 = 2598960$

9. Equivalent to say, in each suit, we select five different cards. In this sense,

we have $4 \times {}_{13}C_5 = 1287$

10. Let's consider this question in different situations:

① if A and H leave, then you have 6 choices (B~G) left for the ramaining one child.

② if A and H stay home together, then we just need to select 3 children in (B~G) to keep you company: ${}_6C_3 = 20$ choices.

Overall, we have $6+20 = 26$ different ways.