1)

$$X\setminus(A\cup B)=(X\setminus A)\cap(X\setminus B)$$

$$X\setminus(A\cup B)=\{x\in X \mid x\notin A \wedge x\notin B\}$$
$$X\setminus A=\{x\in X \mid x\notin A\}$$
$$X\setminus B=\{x\in X \mid x\in B\}$$

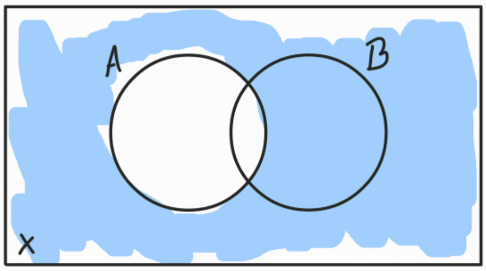
$$\underline{\underline{\{x\in X \mid x\notin A \wedge x\notin B\}=\{x\in X \mid x\notin A \wedge x\notin B\}}}$$

$$X\setminus(A\cap B)=(X\setminus A)\cup(X\setminus B)$$

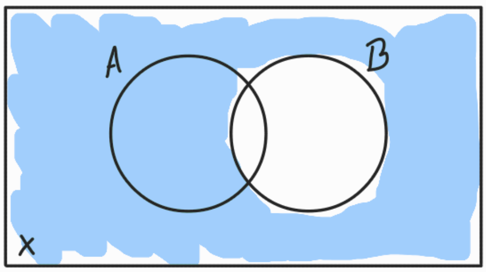
$$X\setminus(A\cap B)=\{x\in X \mid x\notin A \vee x\notin B\}$$
$$(X\setminus A)\cup(X\setminus B)=\{x\in X \mid x\notin A \vee x\notin B\}$$

$$\underline{\underline{\{x\in X \mid x\notin A \vee x\notin B\}=\{x\in X \mid x\notin A \vee x\notin B\}}}$$

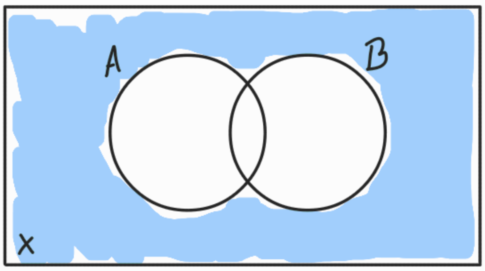
$X\setminus A$



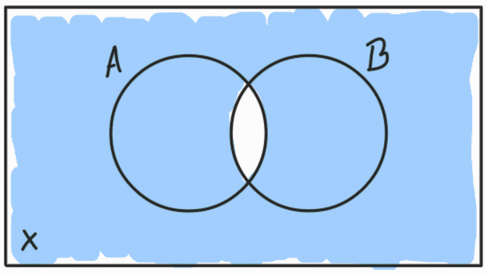
X/B



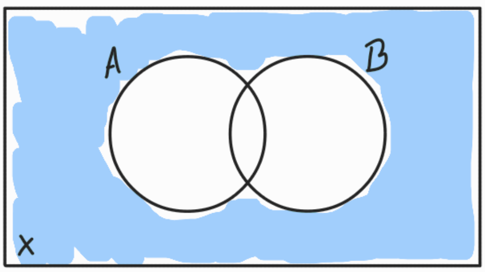
$(X\setminus A)\cap(X\setminus B)$



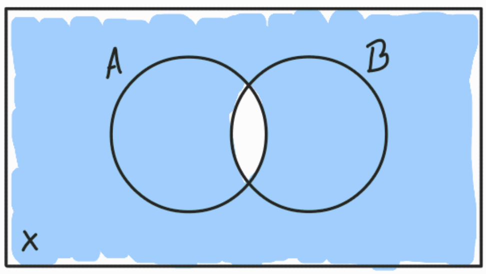
$(X\setminus A)\cup(X\setminus B)$



$X\setminus(A\cup B)$



$X\setminus(A\cap B)$



2)

$$\sum_{i=0}^{n-1} q^i = \frac{1-q^n}{1-q}$$

$n = k$

$$\sum_{i=0}^{k-1} q^i = \frac{1-q^k}{1-q} \Rightarrow \sum_{i=0}^{k} q^i = \frac{1-q^{k+1}}{1-q}$$

$$= \sum_{i=0}^{k} q^i = \frac{1-q^k}{1-q} + q^k = \frac{1-q^k+q^k-q^{k+1}}{1-q} = \underline{\underline{\frac{1-q^{k+1}}{1-q}}}$$

3)

$$\sum_{i=1}^{n} i^3 = \frac{1}{4} n^2 (n+1)^2$$

$n = k$

$$\sum_{i=1}^{k} i^3 = \frac{1}{4} k^2 (k+1)^2$$

$$\sum_{i=1}^{k+1} i^3 = \sum_{i=1}^{k} i^3 + (k+1)^3$$

$$= \sum_{i=1}^{k+1} i^3 = \frac{1}{4}(k+1)^2 \cdot k^3 + (k+1)^2 \cdot (k+1) = (k+1)^2 \cdot \frac{1}{4}(k^2+4k+4)$$

$$= \sum_{i=1}^{k+1} i^3 = (k+1)^2 \cdot \frac{1}{4}(k+2)^2$$

$$= \sum_{i=1}^{k+1} i^3 = \frac{1}{4}(k+1)^2 \cdot (k+2)^2$$

4)

a)

$$\binom{n}{2}+\binom{n+1}{2}=n^2$$

$$LS=\frac{n(n-1)}{2}+\frac{(n+1)\cdot n}{2}=\frac{n^2-n+n^2+n}{2}=\frac{2n^2}{2}=\underline{\underline{n^2}}$$

$$PS=\underline{\underline{n^2}}$$

$$\underline{\underline{LS=PS}}$$

b)

$$LS=2\binom{n}{2}+n=2\,\frac{n(n-1)}{2}+n=n(n-1)+n=n^2-n+n=\underline{\underline{n^2}}$$

$$PS=\underline{\underline{n^2}}$$

$$\underline{\underline{LS=PS}}$$

7)

$$\frac{366!}{366^{30}\cdot(366-30)!}\doteq 0{,}2946$$

$$1-0{,}2946\doteq\underline{\underline{0{,}7053}}$$

Pravděpodobnost, že alespoň 2 studenti mají narozeniny ve stejný den je $\underline{\underline{70{,}53\,\%}}$.

8)

50 posádek

16 zemí

$16 \cdot 3 = 48$

$\underline{\underline{48 < 50}}$

Z toho vyplívá, že některé země měli více než 3 posádky.

10)

$6! = 720$

a) $\frac{6!}{2} = \underline{\underline{360}}$

Protože podmínka nám vyřadí přesně $\frac{1}{2}$ kombinací.

b) $5! = \underline{\underline{120}}$

Protože máme jen jeden blok.

11)

7 figurek

3 barvy

a) $3^7 = \underline{\underline{2187}}$

b) $\binom{7+3-1}{3-1} = \binom{9}{2} = \underline{\underline{36}}$

12)

$\bar{C} = 8!5!$

$S = 9!4!$

$M = 10!3!$

$\bar{C}+S = 5!4!4!$

$S+M = 7!4!3!$

$\bar{C}+M = 6!5!3!$

$\bar{C}+M+S = 5!4!3!3!$

$12! - (8!5! + 9!4! + 10!3! - 5!4!4! - 6!5!3! - 7!4!3! - 5!4!3!3!) = \underline{\underline{445\ 167\ 360}}$