Note Title 10/23/2013

$A \cap B = \{x \mid x \in A \text{ and } x \in B\}$

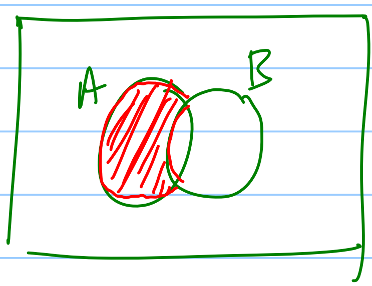
$A \cup B = \{x \mid x \in A \text{ or } x \in B\}.$

$A_1, A_2, \ldots, A_n.$

$A_1 \cap A_2 \cap \cdots \cap A_n = \bigcap_{i=1}^{n} A_i$

$A_1 \cup A_2 \cup \cdots \cup A_n = \bigcup_{i=1}^{n} A_i$

Set difference A, B $A - B = \{x \mid x \in A \text{ and } x \notin B\}$



$\cancel{\{\emptyset\}}$

$A = \{1, 2, 4, 7, 8\}$
$B = \{1, 3, 7, 9, 10, 11\}$

$C = \{x \in \mathbb{Z} : x \text{ is prime}\}$
$D = \{x \in \mathbb{Z} : |x| \leq 10\}$

$A - D = \emptyset$
$A - C = \{1, 4, 8\}.$

$B - C = \{1, 9, 10\}$
$B - D = \{11\}$

~~Complement~~ Complement

Need to define universe set U.

Complement of A : $\overline{A} = \{x \mid x \notin A \ (x \in U)\}$.

$\overline{A} = U - A$.

$U = \mathbb{Z}$ $\quad O = \{x \mid x \text{ is odd}\}$

$\overline{O} = \{x \mid x \text{ is even}\}$

$U = \{1, 2, \ldots, 12\}$

$A = \{1, 2, 4, 7, 8\}$

$B = \{1, 3, 7, 9, 10, 11\}$

$C = \{2, 4, 7, 8, 11\}$

$\overline{A \cup B}$

* $A \cap B = \{1, 7\}$.

$\overline{A \cap B} = \{2, 3, 4, 5, 6, 8, 9, 10, 11, 12\}$

$\overline{A \cap B} \cap C = \{2, 4, 8, 11\}$

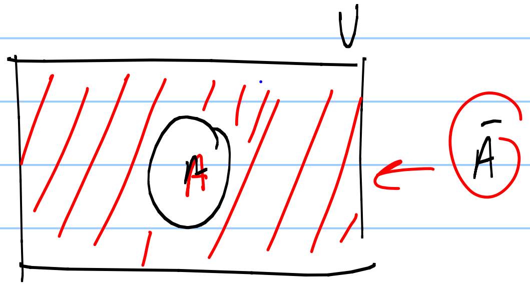
$A \cup B = \{1, 2, 3, 4, 7, 8, 9, 10, 11\}$

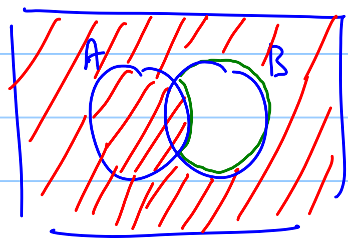
$\overline{A \cup B} = \{5, 6, 12\}$.

$\overline{A} = \{3, 5, 6, 9, 10, 11, 12\}$

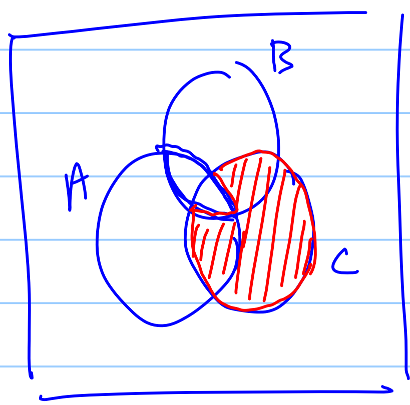
$\overline{A} \cup B = \{1, 3, 5, 6, 7, 9, 10, 11, 12\}$

$(\overline{A \cap B}) \cap C$ *





$\overline{B - A}$

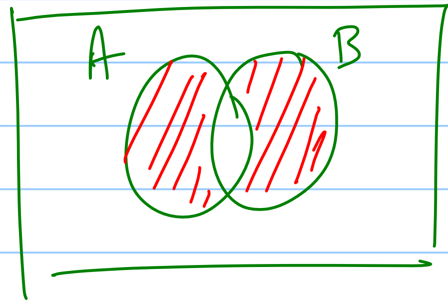


$(\overline{A \cap B}) \cap C$

Symmetric Difference

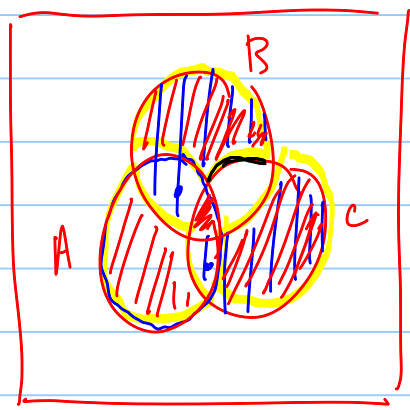
$A \oplus B = \{ x \mid x \in A$ and $x \notin B$ or $x \notin A$ and $x \in B \}$.

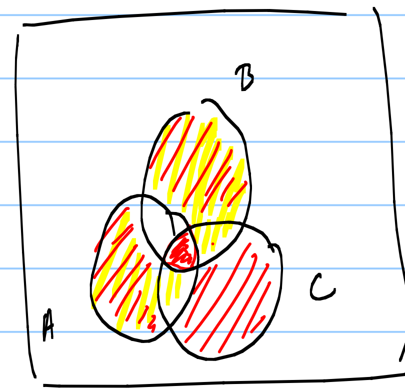
(exclusive or.)

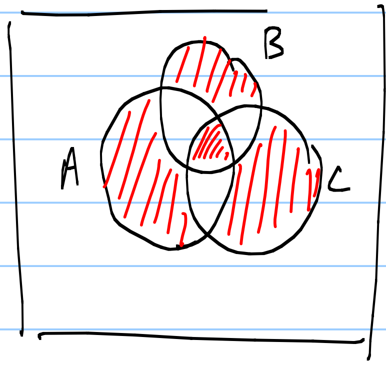


$A \oplus B = (A \cup B) - (A \cap B)$

$A \oplus (B \oplus C) \stackrel{?}{=} (A \oplus B) \oplus C$







$\{a, b\} = \{b, a\}$

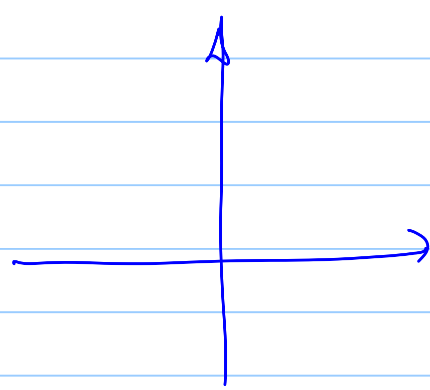
Cartesian Product. Two Sets A & B

in gen $(a,b) \neq (b,a)$.

$A \times B$ set of all ordered pairs (a, b)

$a \in A$ $b \in B$.

$\mathbb{R} \times \mathbb{R}$



(x,y) x and $y \in \mathbb{R}$.

$B \times A = \{(1,x), (1,y), (2,x), (2,y)\}$

$A = \{x, y\}$ $\quad$ $A \times B = \{(x,1), (x,2), (y,1), (y,2)\}$

$B = \{1, 2\}$

$A \cancel{\subseteq A \times B} = \{(y,1), (y,2) \ldots\}$

$B \times A \cap A \times B = \phi$

$A \times B \times C = \{(a,b,c) :$
$a \in A,\ b \in B,\ c \in C\}$

Drinks = { Coffee, Milk }

~~Side~~ Meat = { Bacon, Sausage }

Main = { Eggs, Pancakes, Waffles }

Drinks × Meat × Main =

(Coffee, Bacon, Pancakes) ∈ Drinks × Meat × Main

$\mathbb{R} \times \mathbb{R} \times \mathbb{R} = \mathbb{R}^3$ $\quad$ $A \times A \triangleq A^2$

$A \times A \times A = A^3$

$B = \{0, 1\}$ $\quad$ B^n = set of all sequences of n bits

$B^3 =$ $\qquad (0,0,0) \in B^3$

$\qquad (0,1,1) \in B^3$

Sometimes n-tuples expressed as strings w/o "(" ","

$010 \in B^3$

$C = \{$ all letters, numbers, symbols $\}$

Passwords length 6, 7 or 8.

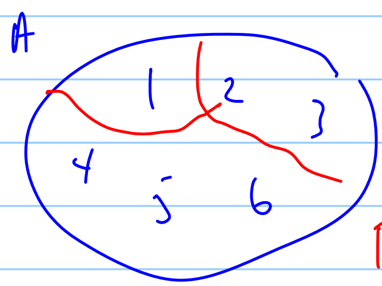
$C^6 \cup C^7 \cup C^8$ $\qquad L = \{$ letters $\}$

At least one non-letter

$$(C^6 \cup C^7 \cup C^8) - (L^6 \cup L^7 \cup L^8)$$

Partition of a set A: $\rightsquigarrow$ set of sets $B_1, B_2, \ldots, B_p$.

$A = \{1,2,3,4,5,6\}$ $\qquad$ (1) $B_1 \cup B_2 \cup \cdots \cup B_p = A$



(2) Mutually disjoint

if $i \neq j$. $\quad B_i \cap B_j = \emptyset$

$B_1 = \{1\}$ $\quad B_2 = \{2,3\}$ $\quad B_3 = \{4,5,6\}$.

$\mathbb{Z}$

$O = \{x \mid x \text{ is odd}\}$

$E = \{x \mid x \text{ is even}\}$

$O \cup E = \mathbb{Z}$

$O \cap E = \emptyset.$