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$\boxed{\begin{array}{l} x\in A^c \Rightarrow x\notin A \\ x\notin A \Rightarrow x\in A^c \end{array}}$

## 46

(d) $(A\cup B)^c = A^c\cap B^c$, demostrarem la doble inclusió.

1er: $(A\cup B)^c \subset A^c\cap B^c$

Sigui $x\in (A\cup B)^c \iff x\notin A\cup B \iff x\notin A \wedge x\notin B \iff x\in A^c \wedge x\in B^c \iff \underline{x\in A^c\cap B^c}$

2n: $A^c\cap B^c \subset (A\cup B)^c$

Sigui $x\in A^c\cap B^c \iff x\in A^c \wedge x\in B^c \iff x\notin A \wedge x\notin B \iff x\notin A\cup B \iff \underline{x\in (A\cup B)^c}$

$\blacksquare$

(e) $(A\cap B)^c = A^c\cup B^c$

1er: $(A\cap B)^c \subset A^c\cup B^c$

Sigui $x\in (A\cap B)^c \iff x\notin A\cap B \iff x\notin A \vee x\notin B \iff x\in A^c \vee x\in B^c \iff \underline{x\in A^c\cup B^c}$

2n: $A^c\cup B^c \subset (A\cap B)^c$

Sigui $x\in A^c\cup B^c \iff x\in A^c \vee x\in B^c \iff x\notin A \vee x\notin B \iff \underbrace{x\notin A\cap B}_{Q} \underset{\downarrow Q}{\vee} \underbrace{x\notin A\cap B}_{Q} \iff$

$\iff x\notin A\cap B \iff \underline{x\in (A\cap B)^c}$ $\blacksquare$

## 50

(g) $\{2,5\}\in P(X) \iff \{2,5\}\subseteq X \iff 2\in X \wedge \cancel{5\in X}$. Fals

(h) $\{2,5\}\subseteq P(X) \iff 2,5\in P(X) \iff \underbrace{2\subseteq X \wedge 5\subseteq X}_{\text{no té sentit}}$. Fals

(i) $\{\emptyset\}\subseteq P(X) \iff \underbrace{\emptyset\in P(X)}_{\text{cert } \forall X \text{ (conjunt)}} \iff \emptyset\subseteq X$ sempre cert.

(j) $\{\emptyset\}\in P(X) \iff \{\emptyset\}\subseteq X \iff \emptyset\in X$ cert.

## 52.

$\boxed{x\in P(X) \iff x\subseteq X}$

(a) $P(X\cup Y)\subseteq P(X)\cup P(Y)$ Falsa

Sigui $X=\{1,2,3\}$, $P(X)=\{\emptyset, \{1\}, \{2\}, \{3\}, \{1,2\}, \{1,3\}, \{2,3\}, \{1,2,3\}\}$.

Sigui $Y=\{4,5\}$, $P(Y)=\{\emptyset, \{4\}, \{5\}, \{4,5\}\}$

$X\cup Y=\{1,2,3,4,5\}$

$P(X\cup Y)=\{\emptyset, \{1\}, \{2\}, \{3\}, \{4\}, \{5\}, \{1,2\}, \{1,3\}, \{1,4\}, \{1,5\}, \{2,3\}, \{2,4\}, \{2,5\}, \{3,4\}, \{3,5\},$
$\{4,5\}, \{1,2,3\}, \{1,2,4\}, \{1,2,5\}, \{2,3,4\}, \{2,3,5\}, \{3,4,5\}, \{1,2,3,4,5\}\}$.

$P(X\cup Y)\not\subseteq P(X)\cup P(Y)$.

(b) $P(X \cup Y) \supseteq P(X) \cup P(Y)$. Cert

Sigui $x \in P(X) \cup P(Y) \Leftrightarrow x \in P(X) \vee x \in P(Y) \Leftrightarrow x \subseteq X \vee x \subseteq Y \Rightarrow x \subseteq X \cup Y \Leftrightarrow$

$\Leftrightarrow x \in P(X \cup Y)$

(c) $P(X \setminus Y) \subseteq P(X) \setminus P(Y)$ Cert.

$x \in P(X \setminus Y) \Leftrightarrow x \subseteq X \setminus Y \Leftrightarrow x \subseteq X \wedge x \nsubseteq Y \Leftrightarrow x \in P(X) \wedge x \notin P(Y) \Leftrightarrow$

$\Leftrightarrow x \in P(X) \setminus P(Y)$

(d) $P(X \setminus Y) \supseteq P(X) \setminus P(Y)$. Fals.

Sigui $X = \{1,2\}$ $\quad X \setminus Y = \{1\}$.

Sigui $Y = \{2,3\}$

$P(X) = \{\emptyset, \{1\}, \{2\}, \{1,2\}\}$

$P(Y) = \{\emptyset, \{2\}, \{3\}, \{2,3\}\}$

$P(X \setminus Y) = \{\emptyset, \{1\}\}$.

$P(X \setminus Y) \not\supseteq P(X) \setminus P(Y)$.