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Evaluation 2

Grade: For each statement (+1 if your answer is correct, -2 if your answer is wrong, 0 otherwise.) For each of the following statements (1-11), say if it is **TRUE** or **FALSE**.

1. $(A \cap B) \cup (A \cap C) = A \cup (B \cap C)$. (FALSE, ex: $A = \emptyset, B = C = \{1\}$)
2. $A \subseteq B \Leftrightarrow A \in 2^B$. (TRUE)
3. $\emptyset \subseteq \emptyset$ (TRUE)
4. $\{\emptyset\} \in \{\emptyset, \{a, b\}\}$. (FALSE)

Let $x \in \mathbb{N}$, (for example $x=3$).

5. $x \in \{\mathbb{N}, \mathbb{R}\}$ (FALSE (the two unique elements of $\{\mathbb{N}, \mathbb{R}\}$ are \mathbb{N} and \mathbb{R}))
6. $\{x\} \in \{\mathbb{N}, \mathbb{R}\}$ (FALSE (see argument of the previous question))
7. $\{x\} \subseteq \{\mathbb{N}, \mathbb{R}\}$ (FALSE, the power set of $\{\mathbb{N}, \mathbb{R}\}$ is exactly $\{\emptyset, \{\mathbb{N}\}, \{\mathbb{R}\}, \{\mathbb{N}, \mathbb{R}\}\}$)

Let X, Y, Z be three sets, $f : X \rightarrow Y, g : Y \rightarrow Z$.

8. If f is not injective then $g \circ f$ is not injective. (TRUE (contrapositive of a course's proposition))
9. If g is surjective then $g \circ f$ is surjective. (FALSE (for example choose f a constant function))

Let E, F be two sets, $A \in 2^E$ and $f : E \rightarrow F$. Let $f|_A : A \rightarrow F$ defined by $f|_A(a) = f(a), \forall x \in A$.

10. f injective $\Rightarrow f|_A$ injective. (TRUE)
11. f surjective $\Rightarrow f|_A$ surjective. (FALSE (choose any bijective function and A a subset of E not equal to E .)