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Evaluation 1

Let A, B and C be three sets, and p, q and r be three propositions. For each of the following statements, say if it is TRUE or FALSE. (+1 if your answer is correct, -1 if your answer is wrong, 0 otherwise.)

1. The power set 2^A of a set A is never empty. TRUE
2. $A \cap B = \emptyset \Rightarrow A \neq B$.FALSE (EX: $A = B = \emptyset$)
3. If $f : A \to B$, then $f(A) = B$. FALSE (EX: $A = B = \{a, b, c\}$ and $f(a) = f(b) = f(c) = a$).
4. If $f : A \to B$, then $f^{-1}(B) = A$. TRUE
5. $[(A \subseteq B) \wedge (B = f(A))] \Rightarrow A = f^{-1}(B)$.FALSE (EX: $f(x) = |x|$, $\forall x \in \mathbb{R}$ and $A = B = [0, 1]$, $f^{-1}(B) = [-1, 1] \neq A$.)
6. $[\neg((p \vee q) \to r)] \leftrightarrow [\neg(p \vee q) \to \neg r]$.FALSE
7. $((p \wedge \neg p) \vee (q \wedge (\neg q)) \to r$. TRUE
8. $\{1\} \in \{\{1, 2\}\}$.FALSE
9. $\emptyset \in 2^A$. TRUE
10. $\emptyset \subseteq 2^A$. TRUE
11. $\emptyset \subseteq (A \cap B)$. TRUE
12. $\{1, 2\} \in \{1, 2\}$ FALSE
13. $\bigcap_{C \in \{\emptyset, \{1,2\}, \{1\}\}} C = \{1\}$. FALSE
14. $\bigcup_{C \in \{\emptyset, \{1,2\}, \{1\}\}} C = \{1, 2\}$. TRUE
15. "If it is raining then the world has a begining or the world has an end" if and only if "it is not raining or the world has a begining or the world has an end." TRUE
16. The negation of "If it is raining then the world has a begining or the world has an end" is "It is raining and the world has not begining nor end." TRUE
17. $A \cap (B \cup C) = (A \cup B) \cap (A \cup C)$.FALSE (EX: $A = \emptyset$ and $B = C \neq \emptyset$.

18. $(x \in A) \wedge (x \in B) \wedge (x \notin A \cup B)$.FALSE
19. $(\forall A)(\forall B)((x \in A) \vee (x \in B)) \Rightarrow (x \in A \cap B)$.FALSE
20. $[(x \in A \setminus B) \vee (x \in B \setminus C)] \wedge [(x \in B \setminus A) \wedge (x \in C \setminus B)]$.FALSE