

Answer on Question #76365 – Math – Discrete Mathematics

Question

Let $X = \{0, 1, 2\}$. Consider the power set $P(X)$. Recall that $P(X) = \{A \text{ such that } A \subseteq X\}$. Determine, if each statement is true or false.

- (a) $X \in P(X)$;
- (b) $\emptyset \in P(X)$;
- (c) $X \subseteq P(X)$;
- (d) $\{0,2\} \in P(X)$;
- (e) $\{0, 2, 1\} \in X$;
- (f) $\{0\} \subseteq X$;
- (g) $\{\{0\}\} \subseteq P(X)$.

Solution

(a). Since $X \subseteq X$ for the set X , then $X \in P(X)$ by definition of $P(X)$.

Answer: The statement is true.

(b). Since $\emptyset \subseteq X$ for X , then $\emptyset \in P(X)$ by definition of $P(X)$.

Answer: The statement is true.

(c). The set $P(X)$ consists of all subsets of X . Consequently, every subset of X lies in $P(X)$ as an element, but not as a subset. Therefore the statement $X \subseteq P(X)$ is not true.

Answer: The statement is false.

(d). Since $\{0,2\} \subseteq X$, then $\{0,2\} \in P(X)$.

Answer: The statement is true.

(e). The set X consists of elements 0, 1, 2 only. Consequently, $\{2, 0, 1\} \notin X$.

Answer: The statement is false.

(f). Since $0 \in X$, then the set $\{0\}$ (which consists of only 0) is a subset of X , i.e. $\{0\} \subseteq X$.

Answer: The statement is true.

(g). Since $\{0\} \in P(X)$, then the set $\{\{0\}\}$ (which consist of only $\{0\}$ element of $P(X)$) is a subset of $P(X)$, i.e. $\{\{0\}\} \subseteq P(X)$.

Answer: The statement is true.