Assignment - 1

Determine the power sets of following

(a) $\{a\}$

(b) $\{\{a\}\}$

(c) $\{\phi, \{\phi\}\}$

2. State T/F if $A = \{\phi, \{\phi\}\}$

(a) $\phi \in P(A)$

(b) $\phi \subseteq P(A)$

(c) $\{\phi\} \subseteq P(A)$

(d) $\{\phi\} \subseteq A$

(e) $\{\phi\} \in P(A)$

(f) $\{\phi\} \in A$

(g) $\{\{\phi\}\} \subseteq P(A)$

(h) $\{\{\phi\}\} \subseteq A$

(i) $\{\{\phi\}\} \in P(A)$

(j) $\{\{\phi\}\} \in A$

(3) Let $A = \{a, \{a\}\}$ Tell T/F

(a) $\phi \in P(A)$

(b) $\phi \subseteq P(A)$

(c) $\{a\} \in P(A)$

(d) $\{a\} \subseteq P(A)$

(e) $\{\{a\}\} \in P(A)$

(f) $\{\{a\}\} \subseteq P(A)$

(g) $\{a, \{a\}\} \in P(A)$

(h) $\{a, \{a\}\} \subseteq P(A)$

(i) $\{\{\{a\}\}\} \in P(A)$

(j) $\{\{\{a\}\}\} \subseteq P(A)$

(4) Let $A = \{\phi\}$. Let $B = P(P(A))$

(a) Is $\phi \in B$? $\phi \subseteq B$?

(b) Is $\{\phi\} \in B$? $\{\phi\} \subseteq B$

(c) Is $\{\{\phi\}\} \in B$? $\{\{\phi\}\} \subseteq B$?

(5) Suppose $U = \{1,2,3,4,5,6,7,8,9\}$

$A = \{1,4,9\}$

$P = \{x : x \in U$ and x is a perfect square$\}$

$R = \{1,2,3,5,7,9\}$

$D = \{2,3,5,7\}$

$N = \{x : x \in U$ and x is a prime$\}$

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(a) Determine which sets are subsets of others

(b) Determine which sets are proper subsets of others

(c) Determine pair of sets which are disjoint

(d) Determine pair of sets which are comparable

(e) Determine pair of sets which are incomparable.

(6) Determine the cardinalities of the sets:

(a) $P = \{n^7 : n$ is a positive integer$\}$

(b) $Q = \{n^{109} : n$ is a positive integer$\}$

(c) $P \cup Q$

(d) $P \cap Q$

7) Let N is the set of all natural numbers. Let P denotes all finite subsets of N. What is cardinality of set P?

8) Determine

a) $\phi \cup \{\phi\}$

b) $\phi \cap \{\phi\}$

c) $\{\phi\} \cup \{a, \phi, \{\phi\}\}$

d) $\phi \oplus \{a, \phi, \{\phi\}\}$

e) $\{\phi\} \oplus \{a, \phi, \{\phi\}\}$

9) Determine T/F and explain

a) $A \cup P(A) = P(A)$

b) $A \cap P(A) = A$

c) $\{A\} \cup P(A) = P(A)$

d) $\{A\} \cap P(A) = A$

e) $A - P(A) = A$

f) $P(A) - \{A\} = P(A)$

10) Let $A = \{\phi, a\}$ construct

a) $A - \phi$

b) $\{\phi\} - A$

c) $A \cup P(A)$

d) $A \cap P(A)$

(11) Let A, B, C be sets. Under what condition is each of the following true?

(a) $(A-B) \cup (A-C) = \phi$

(b) $(A-B) \cap (A-C) = \phi$

(12) What can you say about P and Q if

(a) $P \cap Q = P$

(b) $P \cup Q = P$

(c) $P \oplus Q = P$

(d) $P \cap Q = P \cup Q$

(13) Let A, B, C be sets

show (a) $(A-B)-C = A-(B \cup C)$

(b) $(A-B)-C = (A-C)-B$

(c) $(A-B)-C = (A-C)-(B-C)$

(14) Given $P \cup Q = P \cup R$, is it necessary that $Q = R$. Justify

(15) Prove $(A-B) \cap B = \phi$

(16) Given that $(A \cap C) \subseteq (B \cap C)$
$(A \cap C') \subseteq (B \cap C')$

Show $A \subseteq B$