Problem

Let A be the set {x, y, z} and B be the set {x, y}.

a. Is A a subset of B?

b. Is B a subset of A?

c. What is A ∪ B?

d. What is A ∩ B?

e. What is A × B?

f. What is the power set of B?

Step-by-step solution

Step 1 of 6

(a) No, A is not a subset of B. A contains an extra element z which is not there in B.

Comment

Step 2 of 6

(b) Yes, B is a subset of A, because every member of B also is a member of A. In fact B is a proper subset of A in this case.

Comment

Step 3 of 6

(c)

$$\begin{aligned} A \cup B &= \{x, y, z\} \cup \{x, y\} \\ &= \{x, y, z\} \\ &= A \end{aligned}$$

Comment

Step 4 of 6

(d)

$$\begin{aligned} A \cap B &= \{x, y, z\} \cap \{x, y\} \\ &= \{x, y\} \\ &= B \end{aligned}$$

Comment

Step 5 of 6

(e)

$$A \times B = \{(a, b) : a \in A \text{ and } b \in B\}$$
$$= \{(x, x), (x, y), (y, x), (y, y), (z, x), (z, y)\}$$

Comment

Step 6 of 6

(f) Power set of B is {∅, {x}, {y}, {x, y}}