

CSE 16

Homework Assignment 1

Solutions to Selected Problems

(1.2) 2g

Let $A = \{\pi, e, 0\}$ and $B = \{0, 1\}$. Then

$$B \times B = \{ (0,0), (0,1), (1,0), (1,1) \}$$

and

$$A \times (B \times B) = \{ (\pi, (0,0)), (\pi, (0,1)), (\pi, (1,0)), (\pi, (1,1)), \\ (e, (0,0)), (e, (0,1)), (e, (1,0)), (e, (1,1)), \\ (0, (0,0)), (0, (0,1)), (0, (1,0)), (0, (1,1)) \}$$

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Let $S = \{ \{0, 1\}, \{0, 1, \{2\}\}, \{0\} \}$. Then

$$\mathbb{P}(S) = \{ \emptyset, \\ \{\{0, 1\}\}, \quad \{\{0, 1, \{2\}\}\}, \quad \{\{0\}\}, \\ \{\{0, 1\}, \{0, 1, \{2\}\}\}, \quad \{\{0, 1\}, \{0\}\}, \quad \{\{0, 1, \{2\}\}, \{0\}\}, \\ \{\{0, 1\}, \{0, 1, \{2\}\}, \{0\}\} \\ \}$$

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Let $|A| = m$ and $|B| = n$. Then

$$|\mathbb{P}(B)| = 2^n$$

and

$$|A \times \mathbb{P}(B)| = m \cdot 2^n$$

Therefore

$$|\mathbb{P}(A \times \mathbb{P}(B))| = 2^{m \cdot 2^n}$$

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For each $\alpha \in I$, let A_α be a set. Suppose that $\emptyset \neq J \subseteq I$. It follows that

$$\bigcap_{\alpha \in I} A_\alpha \subseteq \bigcap_{\alpha \in J} A_\alpha$$

Explanation:

Let x be an element of the left hand side (LHS). Then $x \in A_\alpha$ for all $\alpha \in I$. Since $J \subseteq I$, this implies $x \in A_\alpha$ for all $\alpha \in J$. Therefore x is also a member of the right hand side (RHS), and hence $\text{LHS} \subseteq \text{RHS}$. ■