Systems Theory - Homework 1

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Exercise 2.1

A

$|A \times B^2 \times C^3| = |A| \cdot |B|^2 \cdot |C|^3$

C

$|\mathcal{P}(A) \times (\mathcal{P}(B))^2 \times (\mathcal{P}(B))^3| = |\mathcal{P}(A) \times (\mathcal{P}(B))^5| = 2^{|A|} \cdot 2^{|A|^5} = 2^{|A|+|A|^5}$

E

$|\mathcal{P}(\mathcal{P}(\mathcal{P}(A))) \times \mathcal{P}(\mathcal{P}(B))| = 2^{2^{2^{|A|}}} \cdot 2^{2^{|B|}} = 2^{2^{2^{|A|}}+2^{|B|}}$

F

$|(A \times B) \times (B \times C) \times (D \times E \times F)| = |A| \cdot |B|^2 \cdot |C| \cdot |D| \cdot |E| \cdot |F|$

Exercise 2.2

A

Reflexive, Transitive.

C

Reflexive, Symmetric, Transitive.

D

Antireflexive, Symmetric.

E

Reflexive, Symmetric.

G

Antireflexive, Antisymmetric, Transitive.

Exercise 2.3

$S(\{A, \mathbb{R}\}, A \times A \times \mathbb{R}[0, 1])$

Exercise 2.4

$S(\{D, I\}, I \times D)$

Exercise 2.5

$S(\{X, Y, Z, P\}, X \times Z \times Y \times Z \times P)$