CSE581 Extra Q4 FALL 2024
(2pts extra credit)

DEFINITIONS and basic Facts

Here are 15 definitions with **Yes/No** answers about their correctness

Some of provided answers **are correct** and some are **are wrong**

Read carefully. **Circle** the **correct answer**

1. onto function $f: A \xrightarrow{onto} B$ if and only if $\forall b \in A \exists a \in B\ f(a) = b$

$\boxed{\mathbf{n}}$

2. Generalized Intersection Given a sequence $\{A_n\}_{n \in N}$ of sets, $\bigcap_{n \in N} A_n = \{x: \ \exists n \in N\ x \in A_n\}$

$\boxed{\mathbf{n}}$

3. Partition A family of sets $\mathbf{P} \subseteq \mathcal{P}(A)$ is called a partition of the set A if and only if

1. $\forall X \in \mathbf{P}\ (X \neq \emptyset)$, 2. $\forall X, Y \in \mathbf{P}\ (X \cup Y = \emptyset)$, 3. $\bigcup \mathbf{P} = A$

$\boxed{\mathbf{n}}$

4. Maximal $a_0 \in A$ is a maximal element in the poset $(A, \leq)$ if and only if $\neg\ \forall a \in A\ (a_0 \leq a\ \cap\ a_0 \neq a)$

$\boxed{\mathbf{n}}$

5. Smallest (least) $a_0 \in A$ is a smallest (least) element in the poset $(A, \leq)$ if and only if $\exists a \in A\ (a_0 \leq a)$

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6. Upper Bound Let $B \subseteq A$ and $(A, \leq)$ is a poset. $a_0 \in A$ is an upper bound of a set B if and only if $\forall b \in B\ (b \leq a_0)$.

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7. Least upper bound of B (lub B) Given a set $B \subseteq A$ and $(A, \leq)$ a poset. $b_0 = lubB$ if and only if b_0 is the least (smallest) element in the set of all upper bounds of B, ordered by the poset order $\leq$.

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8. Lattice A poset $(A, \leq)$ is a lattice if and only if For all $a, b \in A$ $lub\{a, b\}$ or $glb\{a, b\}$ exist

$\boxed{\mathbf{y}}$

9. Lattice intersection (joint) The element $glb\{a, b\} = a \cap b$ is called a lattice intersection (joint) of a and b

$\boxed{\mathbf{y}}$

10. Lattice as an Algebra An algebra $(A, \cup, \cap)$, where $\cup, \cap$ are two argument operations on A is called a lattice if and only if the following conditions hold (they are called lattice axioms)
For any $a, b, c \in A$

L1 $a \cup b = b \cup a$ and $a \cap b = b \cap a$

L2 $(a \cup b) \cup c = a \cup (b \cup c)$ and $(a \cap b) \cap c = a \cap (b \cap c)$

L3 $a \cap (a \cup b) = a$ and $a \cup (a \cap b) = a$

$\boxed{\mathbf{y}}$

11. Lattice special elements

Given a **lattice poset** $(A, \leq)$

The **greatest** element in $(A, \leq)$ (if exists) is denoted by 1 and is called a **lattice zero**

y

12. Boolean Algebra A distributive lattice with zero and unit such that each element has a complement is called a Boolean Algebra

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13. Finite Posets If $(A, \preceq)$ is a finite poset (i.e. A is a finite set), then a unique maximal (if exists) is the largest element and a unique minimal (if exists) is the least element.

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14. Cardinality Aleph zero We say that a set A has a cardinality $\aleph_0$ ($|A| = \aleph_0$) if and only if $|A| = |N|$

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15. Power ($\mathcal{M}^{\mathcal{N}}$) $\mathcal{M}^{\mathcal{N}} = card\{f : \ f : A \longrightarrow B\}$, where A, B are such that $|A| = \mathcal{M}$, $|B| = \mathcal{N}$

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