Sets (S)

	Chapter	Lecture	Assignment
Sets	1, 6	3	2

1. (6 pts) Which of the following statements is **true** for all sets A?

- ☐ $A \times \emptyset = \emptyset$.
- ☐ $\emptyset \in A$.
- ☐ $A \cap \emptyset = A$.
- ☐ $A \subseteq P(A)$.

1. (6 pts) Which of the following statements is **true** for all sets A?

- ☑ A $A \times \emptyset = \emptyset$.
- B $\emptyset \in A$.
- C $A \cap \emptyset = A$.
- D $A \subseteq P(A)$.

1. (6 pts) Which of the following statements is **true** for all sets A?

- ☐ $A \subseteq \emptyset$.
- ☐ $A \in A$.
- ☐ $A \in P(A)$.
- ☐ $A \cup \emptyset = \emptyset$.

1. (6 pts) Which of the following statements is **true** for all sets A?

- A $A \subseteq \emptyset$.
- B $A \in A$.
- ☑ A $A \in P(A)$.
- D $A \cup \emptyset = \emptyset$.

1. (6 pts) Which of the following statements is **false**?

- ☐ $\emptyset \subseteq \{1, 2, 3\}$.
- ☐ $\{1, 2, 3\} \subseteq \mathcal{P}(\{1, 2, 3\})$.
- ☐ $\{1, 2, 3\} \cup \emptyset = \{1, 2, 3\} - \emptyset$.
- ☐ $\{1, 2, 3\} \times \emptyset = \{1, 2, 3\} \cap \emptyset$.

1. (6 pts) Which of the following statements is **false**?

- A $\emptyset \subseteq \{1, 2, 3\}$.
- ☑ B $\{1, 2, 3\} \subseteq \mathcal{P}(\{1, 2, 3\})$.
- C $\{1, 2, 3\} \cup \emptyset = \{1, 2, 3\} - \emptyset$.
- D $\{1, 2, 3\} \times \emptyset = \{1, 2, 3\} \cap \emptyset$.

1. (6 pts) Which of the following statements is **true**?

- ☐ For any set A, we have that $(A \cup A) - A = A$.
- ☐ $\{a, b\} \times \{1, 2\} = \{(a, 1), (b, 2)\}$
- ☐ $\{1, 2\} \cup \{2, 3\} \subseteq \{1, 2, 3, 4\}$
- ☐ $\{\emptyset\} \in \mathcal{P}(\{1, 2, 3\})$

1. (6 pts) Which of the following statements is **true**?

- ☐ $\{1, 2\} \in \{1, 2, 3\}$
- ☐ $\{1, 2\} \times \{3, 4\} = \{(1, 3), (2, 4)\}$
- ☐ $\{1, 2, 3\} \cap \{0, 1\} \subseteq \{1, 2\}$
- ☐ $\{1, 2\} \cap \mathcal{P}(\{1, 2, 3\}) = \{1, 2\}$

1. (6 pts) Which of the following statements is **true**?

- ☐ For any set A, we have that $(A \cup A) - A = A$.
- ☐ $\{a, b\} \times \{1, 2\} = \{(a, 1), (b, 2)\}$
- ☑ $\{1, 2\} \cup \{2, 3\} \subseteq \{1, 2, 3, 4\}$
- ☐ $\{\emptyset\} \in \mathcal{P}(\{1, 2, 3\})$

1. (6 pts) Which of the following statements is **true**?

- ☐ $\{1, 2\} \in \{1, 2, 3\}$
- ☐ $\{1, 2\} \times \{3, 4\} = \{(1, 3), (2, 4)\}$
- ☑ $\{1, 2, 3\} \cap \{0, 1\} \subseteq \{1, 2\}$
- ☐ $\{1, 2\} \cap \mathcal{P}(\{1, 2, 3\}) = \{1, 2\}$

Solution: Because $\{1, 2, 3\} \cap \{0, 1\} = \{1\}$ and $\{1\} \subseteq \{1, 2\}$.

1. (6 pts) Which of the following statements is **true**?

☐ For any set A, we have that $(A \cup A) - A = A$.

☐ $\{a, b\} \times \{1, 2\} = \{(a, 1), (b, 2)\}$

☐ $\{1, 2\} \cup \{2, 3\} \subseteq \{1, 2, 3, 4\}$

☐ $\{\emptyset\} \in \mathcal{P}(\{1, 2, 3\})$

1. (6 pts) Which of the following statements is **true**?

☐ $1 \subseteq \{1, 2, 3\}$

☐ $\{1\} \times \{2, 3\} = \{(1, 2), (1, 3)\}$

☐ $\{1\} \in \{1, 2, 3\}$

☐ $\mathcal{P}(\{1, 2, 3\}) = \{\emptyset, 1, 2, 3\}$

1. (2 pts) Which of the following statements is *true*?

☐ $\{a, b\} \times \{1, 2\} = \{(a, 1), (b, 2)\}$

☐ $\emptyset \subseteq \{1, 2, 3, 4, 5, 6\}$

☐ $(\{1, 2\} \cup \{1, 3\}) \cap \{1, 3\} = (\{1, 2\} \cap \{1, 3\}) \cup \{1, 2\}$

☐ For any nonempty set A we have that $A \cap \emptyset = A$

1. (6 pts) Which of the following statements is **true**?

A For any set A, we have that $(A \cup A) - A = A$.

B $\{a, b\} \times \{1, 2\} = \{(a, 1), (b, 2)\}$

☑ $\{1, 2\} \cup \{2, 3\} \subseteq \{1, 2, 3, 4\}$

D $\{\emptyset\} \in \mathcal{P}(\{1, 2, 3\})$

1. (6 pts) Which of the following statements is **true**?

A $1 \subseteq \{1, 2, 3\}$

☑ $\{1\} \times \{2, 3\} = \{(1, 2), (1, 3)\}$

C $\{1\} \in \{1, 2, 3\}$

D $\mathcal{P}(\{1, 2, 3\}) = \{\emptyset, 1, 2, 3\}$

1. Which of the following statements is *true*?

A $\{a, b\} \times \{1, 2\} = \{(a, 1), (b, 2)\}$

☑ $\emptyset \subseteq \{1, 2, 3, 4, 5, 6\}$

C $(\{1, 2\} \cup \{1, 3\}) \cap \{1, 3\} = (\{1, 2\} \cap \{1, 3\}) \cup \{1, 2\}$

D For any nonempty set A we have that $A \cap \emptyset = A$

1. (6 pts) Which of the following statements is **true**?

- ☐ $A \subseteq \emptyset$ for all sets A.
- ☐ $P(\emptyset) = \emptyset$.
- ☐ $A \cup \emptyset = \emptyset$ for all sets A.
- ☐ $A \cap \emptyset = \emptyset$ for all sets A.

2. (6 pts) Let A be a subset of $\mathbb{Z} = \{\dots, -2, -1, 0, 1, 2, \dots\}$ and $f : A \to \mathbb{Z}$ a function defined by $f(x) = x^2$ for all $x \in A$. Depending on how we choose the set A, the function f has different properties. Choose A such that f is *both* one-to-one *and* has range $\{0, 4, 16\}$:

- ☐ $A = \emptyset$.
- ☐ $A = \{0, 4, 16\}$.
- ☐ $A = \{-4, 0, 2\}$.
- ☐ $A = \{-4, -2, 0, 2, 4\}$.

1. (6 pts) Which of the following statements is **true**?

- ☐ $\{1, 2, 3\} \times \emptyset = \{(1, \emptyset), (2, \emptyset), (3, \emptyset)\}$.
- ☐ $\{1, 2, 3\} \subseteq \{1, 2, 3\} \cap \{2, 3, 4\}$.
- ☐ $\{1, 2, 3\} \in P(\{1, 2, 3\})$.
- ☐ $\{1, 2, 3\} \cup \emptyset = \emptyset$.

1. (6 pts) Which of the following statements is **true**?

- A $A \subseteq \emptyset$ for all sets A.
- B $P(\emptyset) = \emptyset$.
- C $A \cup \emptyset = \emptyset$ for all sets A.
- ☑ $A \cap \emptyset = \emptyset$ for all sets A.

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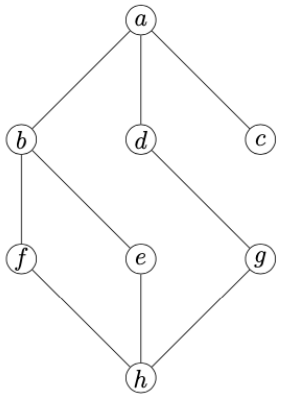
- A $A = \emptyset$.
- B $A = \{0, 4, 16\}$.
- ☑ $A = \{-4, 0, 2\}$.
- D $A = \{-4, -2, 0, 2, 4\}$.

1. (6 pts) Which of the following statements is **true**?

- A $\{1, 2, 3\} \times \emptyset = \{(1, \emptyset), (2, \emptyset), (3, \emptyset)\}$.
- B $\{1, 2, 3\} \subseteq \{1, 2, 3\} \cap \{2, 3, 4\}$.
- ☑ $\{1, 2, 3\} \in P(\{1, 2, 3\})$.
- D $\{1, 2, 3\} \cup \emptyset = \emptyset$.

7. (6 pts) Let $(\{a, b, c, d, e, f, g, h\}, \preceq)$ be the partially ordered set defined by the following Hasse diagram:



Which of the following statements is **true**?

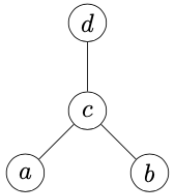
☐ a is the greatest element.

☐ h is the least element.

☐ a and f are incomparable.

☐ $g \preceq c$.

8. (2 pts) The following is the Hasse diagram for the partially ordered set $(\{a, b, c, d\}, \preccurlyeq)$.



Which of the following statements is *true*?

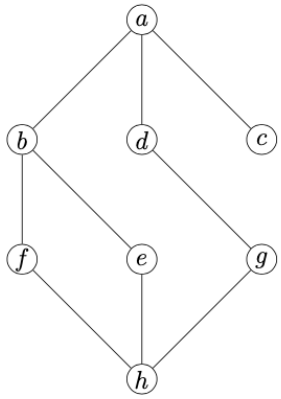
☐ $d \preccurlyeq c$

☐ $a \preccurlyeq b$

☐ There is no least element

☐ There is no greatest element

7. (6 pts) Let $(\{a, b, c, d, e, f, g, h\}, \preceq)$ be the partially ordered set defined by the following Hasse diagram:



Which of the following statements is **true**?

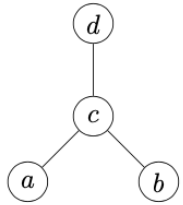
☑ a is the greatest element.

B h is the least element.

C a and f are incomparable.

D $g \preceq c$.

8. The following is the Hasse diagram for the partially ordered set $(\{a, b, c, d\}, \preccurlyeq)$.



Which of the following statements is *true*?

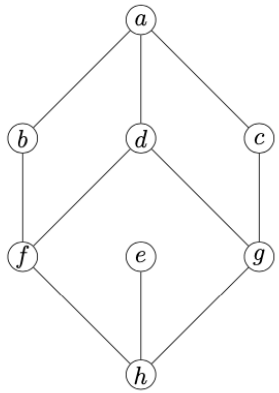
A $d \preccurlyeq c$

B $a \preccurlyeq b$

☑ There is no least element

D There is no greatest element

13. (8 pts) Let $(\{a, b, c, d, e, f, g, h\}, \preceq)$ be the partially ordered set defined by the following Hasse diagram:



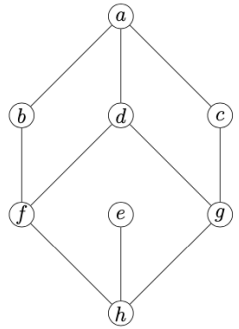
(a) Find all minimal elements.

(b) Find all maximal elements.

(c) Find all least elements.

(d) Find all greatest elements.

13. (8 pts) Let $(\{a, b, c, d, e, f, g, h\}, \preceq)$ be the partially ordered set defined by the following Hasse diagram:



(a) Find all minimal elements.
Solution: h

(b) Find all maximal elements.
Solution: a, e

(c) Find all least elements.
Solution: h is the least element.

(d) Find all greatest elements.
Solution: There is no greatest element.