

## Homework #6 Solutions

### Problems

Let:

$$A = \{n \in \mathbb{Z} \mid 0 < n \leq 3\}$$

$$B = \{\sqrt{n} \mid n \in \mathbb{N} \text{ and } 1 \leq n \leq 4\}$$

1. Write  $A$  in roster form.

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

2. Write  $B$  in roster form.

$$B = \{1, \sqrt{2}, \sqrt{3}, 2\}$$

3. Is  $A = B$ ? Why or why not?

No, because  $3 \in A$  but  $3 \notin B$ .

4. Is  $A \subseteq B$ ? Why or why not?

No, because  $3 \in A$  but  $3 \notin B$ .

5. Is  $B \subseteq A$ ? Why or why not?

No, because  $\sqrt{2} \in B$  but  $\sqrt{2} \notin A$ .

6. Is  $A \subset B$ ? Why or why not?

No, because  $3 \in A$  but  $3 \notin B$ .

7. Construct  $A \cup B$ .

$$A \cup B = \{1, 2, 3, \sqrt{2}, \sqrt{3}\}$$

8. Construct  $B \cup A$ .

$$B \cup A = A \cup B = \{1, 2, 3, \sqrt{2}, \sqrt{3}\}$$

9. Construct  $A \cap B$ .

$$A \cap B = \{1, 2\}$$

10. Construct  $B \cap A$ .

$$B \cap A = A \cap B = \{1, 2\}$$

11. Construct  $A - B$ .

$$A - B = \{3\}$$

12. Construct  $B - A$ .

$$B - A = \{\sqrt{2}, \sqrt{3}\}$$

13. Construct  $A \times B$ .

$$\begin{aligned} A \times B = \{ & (1, 1), (1, \sqrt{2}), (1, \sqrt{3}), (1, 2), \\ & (2, 1), (2, \sqrt{2}), (2, \sqrt{3}), (2, 2), \\ & (3, 1), (3, \sqrt{2}), (3, \sqrt{3}), (3, 2) \} \end{aligned}$$

14. Construct  $B \times A$ .

$$\begin{aligned} B \times A = \{ & (1, 1), (1, 2), (1, 3), \\ & (\sqrt{2}, 1), (\sqrt{2}, 2), (\sqrt{2}, 3), \\ & (\sqrt{3}, 1), (\sqrt{3}, 2), (\sqrt{3}, 3), \\ & (2, 1), (2, 2), (2, 3) \} \end{aligned}$$

15. Construct  $\mathcal{P}(A)$ .

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

16. Construct  $\mathcal{P}(B)$ .

$$\begin{aligned} \mathcal{P}(B) = \{ & \emptyset, \{1\}, \{\sqrt{2}\}, \{\sqrt{3}\}, \{2\}, \\ & \{1, \sqrt{2}\}, \{1, \sqrt{3}\}, \{1, 2\}, \{\sqrt{2}, \sqrt{3}\}, \{\sqrt{2}, 2\}, \{\sqrt{3}, 2\}, \\ & \{1, \sqrt{2}, \sqrt{3}\}, \{1, \sqrt{2}, 2\}, \{1, \sqrt{3}, 2\}, \{\sqrt{2}, \sqrt{3}, 2\}, \\ & \{1, \sqrt{2}, \sqrt{3}, 2\} \} \end{aligned}$$