Assignment # 01 14 Sept 2025 David Haberkorn

Problem 1

(a) $|A| = 6$
(b) $|B| = 0$
(c) $|C| = 3$
(d) $|D| = 3$
(e) $|E| = 10$
(f) $|F| = \infty$

Problem 2

(a) $A = \{\cdots, -4, -1, 2, 5, 8, \cdots\} = \{3n + 2 : n \in \mathbb{Z}\}$
(b) $B = \{\cdots, -5, 0, 5, 10, 15 \cdots\} = \{5n : n \in \mathbb{Z}\}$
(c) $C = \{1, 8, 27, 64, 125 \cdots\} = \{n^3 : n \in \mathbb{Z}^+\}$

Problem 3

Let
$A = \{n \in \mathbb{Z} : 2 \leq |n| < 4\}$
$B = \{x \in \mathbb{Q} : 2 < x \leq 4\}$
$C = \{x \in \mathbb{R} : x^2 - (2 + \sqrt{2})x + 2\sqrt{2} = 0\}$
$D = \{x \in \mathbb{Q} : x^2 - (2 + \sqrt{2})x + 2\sqrt{2} = 0\}$

(a) A = {-3, -2, 2, 3}
(b) Let E be the set $\{\frac{7}{3}, \frac{8}{3}, \frac{10}{3}\}$. The elements of E are in B, but not in A.
(c) $C = \{-2, -\sqrt{2}\}$
(d) $D = \{-2\}$
(e) $|A| = 4, |C| = 2, |D| = 1$

Problem 4

For $A = \{2, 3, 5, 7, 8, 10, 13\}$, let

$$B = \{x \in A : x = y + z, where y, z \in A\}$$

$$C = \{r \in B : r + s \in B for some s \in B\}.$$

Therefore, $B = \{5, 7, 8, 10, 13\}$ and $C = \{2, 3, 5, 7, 8, 10\}$

Problem 5

(a) $A = \{1\}, B = \{1, 2\}, C = \{1, 2, 3\}$
(b) $A = \{1, 2, 3\}, B = \{A, 7, \pi\}, C = \{\{A, 7, \pi\}, e\}$
(c) $A = \{\Psi\}, B = \{\kappa, \{\Psi\}, \Omega\}, C = \{17, \Psi\}$