

Math 240: Introduction to Mathematical Thought

Homework 1, Solutions

- 1.4** (a) $A = \{-3, -2, -1, 0, 1, 2, 3, 4\}$
(b) $B = \{-2, -1, 0, 1, 2\}$
(c) $C = \{1, 2, 3, 4\}$
(d) $D = \{0, 1\}$
(e) $E = \{\} = \emptyset$
- 1.8** (a) $A = \{-3, -2, 2, 3\}$
(b) For example, $21/10, 11/5, 23/10$. Infinitely many other answers can be correct.
(c) $C = \{2, \sqrt{2}\}$
(d) $D = \{2\}$
(e) $|A| = 4, |C| = 2, |D| = 1$
- 1.12** $A = B = D = E = \{-1, 0, 1\}$ and $C = \{0, 1\}$
- 1.20** (a) False; the set $A = \{1, \{1\}\}$ is a counterexample.
(b) True; with the given information $2 < 2^{|B|} < |C|$, so because $2^{|B|}$ is at least 4, we must have $|C| \geq 5$.
(c) False; if $A = \emptyset$ and $B = \{1\}$, then $\mathcal{P}(A) = \{\emptyset\}$ and $\mathcal{P}(B) = \{\emptyset, B\}$.
(d) True; there are only three *distinct* two-element subsets of $\{1, 2, 3\}$, namely: $\{1, 2\}$, $\{1, 3\}$ and $\{2, 3\}$.
- 1.22** (a) $A \cup B = \{1, 3, 5, 9, 13, 15\}$
(b) $A \cap B = \{9\}$
(c) $A - B = \{1, 5, 13\}$
(d) $B - A = \{3, 15\}$
(e) $\overline{A} = \{3, 7, 11, 15\}$
(f) $A \cap \overline{B} = \{1, 5, 13\}$
- 1.32** For example as subsets we could take: $\{1, 2\}$, $\{1, 3\}$, $\{2, 3\}$, $\{1, 2, 3\}$. Then the six pairwise intersections of these sets are:
- $$\{1\}, \{2\}, \{1, 2\}, \{3\}, \{1, 3\}, \{2, 3\}.$$