Proof Writing: Set Theory (Day 1)

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1 Sets

A set is a collection of objects known as elements. Sets can be either finite, or infinte.

1.1 Finite Sets

Examples:
$$\{1, 2, 3, 4, 5, 6\}$$
$$\{\text{all letters of the alpabet}\}$$

1.2 Infinte Sets

Examples:
$$A = \{1, 3, 5, ...\}$$
$$B = \{\text{all real numbers}\}$$

Sets are made up of elements The relation of "being an element of" is written via:
$$a \in A$$

Means 'a' is an element of 'A'.

2 Warm Up Excercies : Answers

1.
$$\{x \in \mathbb{Z} \text{ s.t } |7x| < 24\} = \\ \{-3, -2, -1, 0, 1, 2, 3\} \tag{1}$$

2.

$$\{x \in \mathbb{R} \text{ s.t } 7x^2 - x^3 = 12x\}$$
$$7x^2 - x^3 - 12x = 0$$
$$x(7x - x^2 - 12) = 0$$
$$-x(x^2 - 7x + 12) = 0$$
$$-x(x - 3)(x - 4) = 0$$
$$x = 0, x = 3, x = 4$$
$$\{x \in \mathbb{R} \text{ s.t } 7x^2 - x^3 = 12x\} = \{0, 3, 4\}$$

3.

$$\{x \in \mathbb{P}(\{1, 2, 3\}) \text{ s.t } |x| = 2\}$$
$$\mathbb{P}(\{1, 2, 3\}) = \{\{\emptyset\}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}\}$$
$$\{x \in \mathbb{P}(\{1, 2, 3\}) \text{ s.t } |x| = 2\} = \{\{1, 2\}, \{1, 3\}, \{2, 3\}\}$$