

Name: _____

Directions: Solve the following problems. Give supporting work/justification where appropriate.

1. [**2 parts, 1 point each**] Express the following sets using a list between braces, using the ellipses if necessary.

(a) $\{2^n: n \in \mathbb{Z} \text{ and } |n| \leq 3\}$

(b) $\{(x, y): x, y \in \mathbb{Z} \text{ and } xy = 25\}$

2. [**4 parts, 1 point each**] Determine whether the following sets are infinite or finite. If the set is finite, then determine its cardinality.

(a) $\{1, \{1\}, \{\{1\}\}, \{\{\{1\}\}\}, \dots\}$

(b) $\{\{1, 2\}, \{2, 1\}, \mathbb{R}\}$

(c) $\{x \in \mathbb{R}: x^2 = 1\}$

(d) $\{\emptyset, \{\}, \{x \in \mathbb{Q}: x \text{ is not an integer}\}\}$

3. [2 parts, 1 point each] Use set-builder notation to express the following sets compactly.

(a) $\{\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \dots\}$

(b) The set of all points (x, y) in the interior of the triangle with vertices $(0, 0)$, $(0, 1)$, and $(1, 0)$.

4. [1 point] Is there a set A which satisfies the following conditions: (1) every element in A is an even integer, and (2) every element in A is an odd integer? If so, then give an example of such a set. If not, then explain why not.

5. [1 point] Use set-builder notation to express the subset of \mathbb{R}^2 displayed below.

