

Name: _____

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

1. [4 parts, 1 point each] Decide whether the following statements are true or false, writing the entire word “true” or “false” to indicate your answer. Give brief explanations.

(a) $\{1, 2, 3\} = \{1, 1, 2, 3, 3\}$

(c) $1 \in \{0, 0.9, 0.99, 0.999, 0.9999, \dots\}$

(b) $\{1, 2, 3\} = \{3, 2, 1\}$

(d) $\{\{1\}, \{1, 1\}\} = \{\{1\}\}$

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) $\{\mathbb{R}\}$

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

(d) $\{1, 2, 3, \{1, 2\}, 1, \{2, 1, 2\}\}$

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

(a) $\{0, 0.9, 0.99, 0.999, 0.9999, \dots\}$

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

4. [2 points] Use set-builder notation to express the subset of $\mathbb{R}^2$ displayed below.

