Cardinality, Equality and Equivalence of Sets

MATH 1001

Quantitative Skills and Reasoning

Definitions Regarding Sets

- A set is **finite** if the number of elements in the set is a whole number. The **cardinal number** of a finite set is the number of elements in the set.
- The cardinal number of a finite set A is denoted by the notation $n(A)$.
  - For instance, if $A = \{2, 4, 6, 8\}$, then $n(A) = 4$.
  - Here, A has a cardinal number of 4, which is sometimes stated as "A has a *cardinality* of 4."

Definitions Regarding Sets

- Find the cardinality of each of the following sets:
  - $J = \{3, 4, 5\}$ $n(J) = 3$

1, 2, 3, 4

  - $S = \{5, 6, 7, 8, \ldots, 37\}$ $n(S) = 33$

$$\begin{array}{r} 37 \\ -\ 4 \\ \hline 33 \end{array}$$

  - $T = \{2, 7, 2, 51\}$ $n(T) = 3$

Definitions Regarding Sets

- Set A is **equal** to set B, denoted by $A = B$, if and only if A and B have exactly the same elements.
  - For instance, $\{a, b, c\} = \{b, a, c\}$.
- Set A is **equivalent** to set B, denoted by $A \sim B$, if and only if A and B have the same number of elements.
- If two sets are equal, must they also be equivalent? Yes

Definitions Regarding Sets

- State whether each of the following pairs of sets are equal, equivalent both, or neither.
  - {a, b, c, d, e}, {4, 7, 9, 14, 20}

    The sets are not equal. However, each set has exactly five elements, so the sets are equivalent.
  - {3, -5, 7}, {3, 4, 7, 5}

    The first set has three elements and the second set has four elements, so the sets are neither equal nor equivalent.