

Section 3-1:

1. Let $X = \{1, 2, 3, 4\}$ and $Y = \{a, b, c, d\}$.
Draw its arrow diagram to decide whether each of the following two sets is a function from X to Y . Explain your decision.
 - a. $\{(1, c), (2, a), (3, b), (4, c), (2, d)\}$
 - b. $\{(1, c), (2, d), (3, a), (4, b)\}$

2. Decide whether each of the following functions is one-to-one. If it is one-to-one, prove it, otherwise, give a counter example.
 - a. $f(n) = 2n$ where $f: \text{Integers} \rightarrow \text{Integers}$
 - b. $g(n) = n^2 - 1$ where $g: \text{Integers} \rightarrow \text{Integers}$

3. Let $h(m, n) = m$ where $h: \text{Integers} \times \text{Integers} \rightarrow \text{Integers}$.
Is h a one-to-one function? Is h an onto function? Prove or disprove them.

4. Let $f(n) = 2n + 1$ and $g(n) = 3n - 1$.
 - a. Find the composition of $f \circ g$.
 - b. Find the composition of $g \circ f$.

5. Let $f(x) = 4x \text{ mod } 6$ where $f: \{0, 1, 2, 3, 4, 5\} \rightarrow \{0, 1, 2, 3, 4, 5\}$.
Draw its arrow diagram to decide whether f is one-to-one, or onto.