2.3 Functions

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Determine whether each of these functions from $\mathbb{Z}$ to $\mathbb{Z}$ is onto (surjective).

a) $f(n) = n - 1$

b) $f(n) = n^2 + 1$

c) $f(n) = n^3$

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Determine the type of each function from $\mathbb{R}$ to $\mathbb{R}$

a) $f(x) = 2x + 1$

b) $f(x) = x^2 + 1$

c) $f(x) = x^3$

d) $f(x) = (x^2 + 1)/(x^2 + 2)$

Extra Problem

Given the following functions f and g, from $\mathbb{R}$ to $\mathbb{R}$, find $f \circ g$.

a) $f(x) = x^2$
$g(x) = x + 1$

b) $f(x) = 2x + 1$
$g(x) = x^2 + 4x + 4$

c) $f(x) = \{(1, 3), (2, 4), (5, 6), (4, 8)\}$
$g(x) = \{(1, 1), (4, 5), (6, 2)\}$

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Let $f(x) = \lfloor x^2/3 \rfloor$. Find $f(S)$ if

c) $S = \{1, 5, 7, 11\}$

d) $S = \{2, 6, 10, 14\}$

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Let $g(x) = \lfloor x \rfloor$. Find

a) $g^{-1}(\{0\})$

b) $g^{-1}(\{-1, 0, 1\})$

c) $g^{-1}(\{x \mid 0 < x < 1\})$

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Find the inverse function of $f(x) = x^3 + 1$.

Extra Problem

For each function from $\mathbb{R}$ to $\mathbb{R}$, if the function has a defined inverse, find it.

a) $f(x) = x^2 - 2$

b) $f(x) = 3$