

§2.5 INVERSE FUNCTIONS

1. *Understand the definitions.*

- *one-to-one function*
- *inverse function*
- *graph of an inverse function*

2. *Determine whether a given function is one-to-one.*

Examples.

2–1. Determine whether each of the functions is one-to-one. Explain your answer.

(a) $f(x) = x^6 - 7$

(b) $g(x) = x^2 - 7x + 2$

(c) $h(x) = \sqrt{3x - 5}$

See also, e.g., problems 1 – 14.

3. *Find the inverse function of a given function and graph it.*

Examples.

3–1. Let $f(x) = \frac{3x + 2}{x - 1}$. Find $f^{-1}(4)$.

3–2. Find the inverse function of $f(x) = \sqrt{x + 5}$. Graph both f and f^{-1} on the same set of axes.

3–3. Find the inverse function of $g(x) = \frac{1}{x-1}$.

See also, e.g., problems 15 – 35.

4. *Beyond the Basics*

Examples.

4–1. Let $g(x) = 1 + \sqrt[3]{x - 2}$. Sketch the graph of g by first finding g^{-1} and sketching the graph of g^{-1} .

4–2. Let $f(x) = 2x + 3$ and $g(x) = 3x + 4$. Show that

$$(f \circ g)^{-1} = g^{-1} \circ f^{-1} \quad \text{and} \quad (g \circ f)^{-1} = f^{-1} \circ g^{-1}.$$