

VERIFYING INVERSES

PROOFS

VERIFYING INVERSES

- f and g are inverses iff ...
- $f(g(x)) = x$ AND $g(f(x)) = x$
- The domain of f must be equal to the range of g , and the range of f must be equal to the domain of g .

EXAMPLE 1

- Verify that f and g are inverses.

$$f(x) = \frac{5}{x-2} \quad g(x) = \frac{5}{x} + 2$$

$$f(g(x)) = \frac{5}{\left(\frac{5}{x} + 2\right) - 2} = \frac{5}{\frac{5}{x}} = \frac{5}{1} \cdot \frac{x}{5} = \frac{\cancel{5}x}{\cancel{5}} = x$$

$$g(f(x)) = \frac{5}{\frac{5}{x-2}} + 2 = \frac{\cancel{5} \cdot \frac{x-2}{\cancel{5}}}{1} + 2 = x - 2 + 2 = x$$

∴ f and g are inverses.

EXAMPLE 2

- Verify that f and g are inverses.

$$f(x) = 2x^3 - 1 \quad g(x) = \sqrt[3]{\frac{x+1}{2}}$$

$$f(g(x)) = 2\left(\sqrt[3]{\frac{x+1}{2}}\right)^3 - 1 = \frac{2 \cdot (x+1)}{2} - 1 = x + 1 - 1 = x$$

$$g(f(x)) = \sqrt[3]{\frac{2x^3 - 1 + 1}{2}} = \sqrt[3]{\frac{\cancel{2}x^3}{\cancel{2}}} = \sqrt[3]{x^3} = x$$

∴ f and g are inverses.