

$$a) f(x) = -6x + 3$$

$$g(x) = \frac{3-x}{6}$$

$$f(g(x))$$

$$= f\left(\frac{3-x}{6}\right)$$

$$= -6\left(\frac{3-x}{6}\right) + 3$$

$$= -3 + x + 3$$

$$= x$$

$$g(f(x))$$

$$= \frac{3 - (-6x + 3)}{6}$$

$$= \frac{3 + 6x - 3}{6}$$

$$= \frac{6x}{6}$$

$$= x$$

The functions $f(x)$ and $g(x)$ are inverses because $f(g(x))=g(f(x))=x$.

$$b) f(x) = 2x^3 - 6$$

$$g(x) = \sqrt[3]{\frac{x+6}{2}}$$

$$f(g(x))$$

$$= f\left(\sqrt[3]{\frac{x+6}{2}}\right)$$

$$= 2\left(\sqrt[3]{\frac{x+6}{2}}\right)^3 - 6$$

$$= 2\left(\frac{x+6}{2}\right) - 6$$

$$= x + 6 - 6$$

$$= x$$

$$g(f(x))$$

$$= \sqrt[3]{\frac{2x^3 - 6 + 6}{2}}$$

$$= \sqrt[3]{\frac{2x^3}{2}}$$

$$= \sqrt[3]{x^3}$$

$$= x$$

The functions $f(x)$ and $g(x)$ are inverses because $f(g(x))=g(f(x))=x$.

$$c) f(x) = \frac{2}{x-3}$$

$$g(x) = \frac{2+3x}{x}$$

$$f(g(x))$$

$$= \frac{2}{\frac{2+3x}{x} - 3}$$

$$= \frac{2}{\frac{2+3x-3x}{x}}$$

$$= \frac{2}{\frac{2+3x-3x}{x}}$$

$$= \frac{2}{\frac{2}{x}}$$

$$= 2 \cdot \frac{x}{2}$$

$$= x$$

$$g(f(x))$$

$$= \frac{2+3\left(\frac{2}{x-3}\right)}{\frac{2}{x-3}}$$

$$= \frac{2+3\left(\frac{2}{x-3}\right) + 6}{\frac{2}{x-3}}$$

$$= \frac{2x-6+6}{x-3}$$

$$= \frac{2x}{x-3}$$

$$= \frac{2x}{x-3} \cdot \frac{x-3}{2}$$

$$= x$$

The functions $f(x)$ and $g(x)$ are inverses because $f(g(x))=g(f(x))=x$.