

1. Given functions $f(x) = 2x + 1$ and $g(x) = x^3$, find the function $(f^{-1} \circ g)^{-1}$.

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2. A function is called self-inverse if $f(x) = f^{-1}(x)$ for all x in the domain.

- (a) Show that $f(x) = \frac{1}{x}, x \neq 0$ is a self-inverse function.

- (b) Find the value of the constant k so that $g(x) = \frac{3x-5}{x+k}, x \neq -k$ is a self-inverse function.

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3. Consider the functions given below.

$$f(x) = 2x + 3 \quad \text{and} \quad g(x) = \frac{1}{x}, x \neq 0$$

- (a) Find $(g \circ f)(x)$ and write down the domain of the function.
- (b) Find $(f \circ g)(x)$ and write down the domain of the function.
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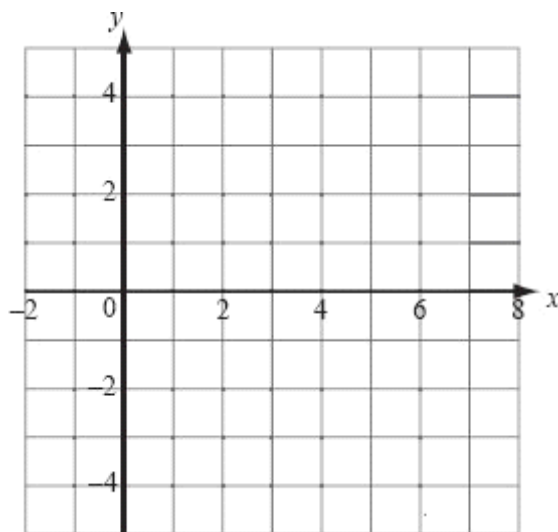
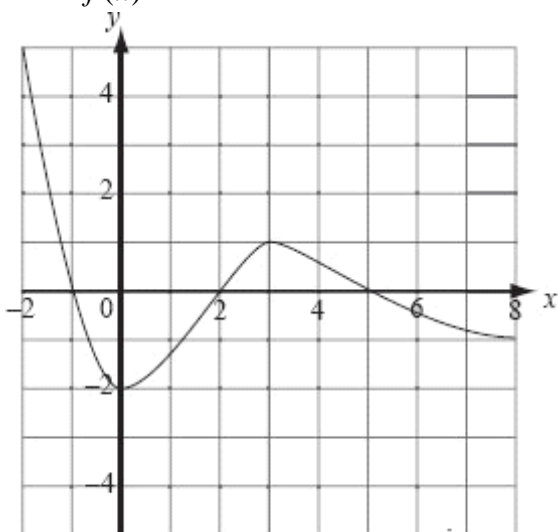
4. Functions g and h are defined by $g(x) = \sqrt{x}$ and $h(x) = \frac{2x-3}{x+1}, x \neq -1$.

(a) Find the range of h .

(b) Solve the equation $h(x) = 0$.

(c) Find the domain and **range (HARD!)** of $g \circ h$.

5. The graph of $y = f(x)$ for $-2 \leq x \leq 8$ is shown. On the set of axes provided, sketch the graph of $y = \frac{1}{f(x)}$, clearly showing any asymptotes and indicating the any maximum or minimum values.



6. Let $f(x) = \frac{1-x}{1+x}$ and $g(x) = \sqrt{x+1}, x > -1$.

Find the set of values of x for which $f(x) \leq g(x)$.

7. Let $g(x) = x + 1$ and $f(x) = \frac{4x}{x-2}, x \neq 2$. If $h(x) = (f \circ g)(x)$, find

(a) $h(x)$;

(b) $h^{-1}(x)$.

8. Let $f(x) = \sqrt{x+4}, x \geq -4$ and $g(x) = x^2, x \in \mathbb{R}$.

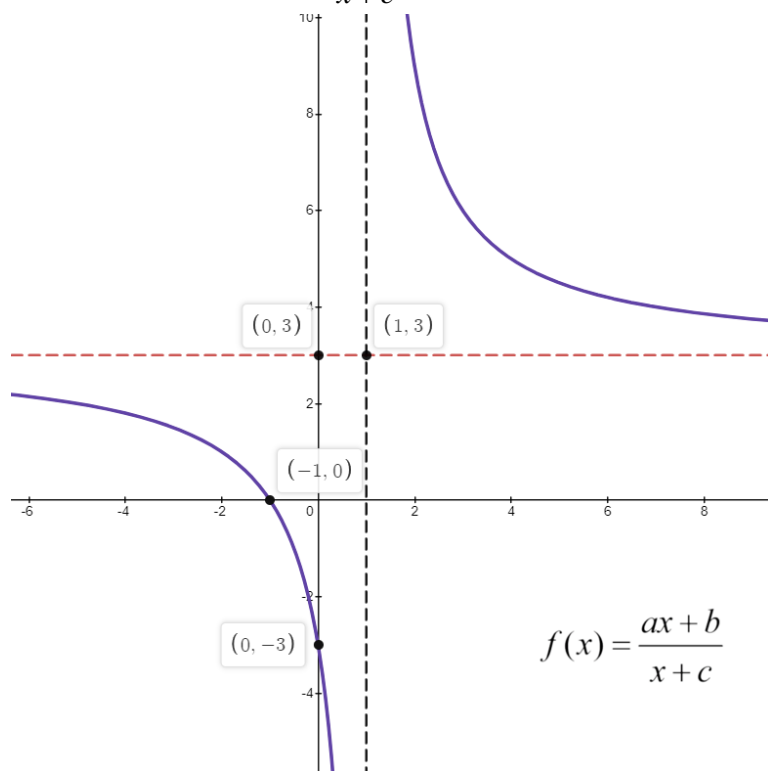
(a) Find $(g \circ f)(3)$.

(b) Find $f^{-1}(x)$.

(c) Write down the domain and range of f^{-1} .

9. State the domain of the function $f(x) = \frac{x^2 - 9}{\sqrt{x} - 9}$.

10. The graph of $f(x) = \frac{ax+b}{x+c}$ is shown below. Find the values of $a, b, c \in \mathbb{R}$.



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11. State the domain of the function $g(x) = \sqrt{\frac{2x}{2-x^2}}$.