

Functions and Graphs

1. For each pair of functions write a formula for i) $f(g(x))$ and ii) $g(f(x))$.

a) $f(x) = x + 5, g(x) = x^2$

b) $f(x) = x^3, g(x) = x + 2$

c) $f(x) = 3x, g(x) = \cos x$

d) $f(x) = 3^x, g(x) = x - 2$

2. Each of the following functions, $f(x)$, has an inverse. Find a formula for the inverse function $f^{-1}(x)$.

a) $f(x) = 3x + 4$ b) $f(x) = 5x - 1$ c) $f(x) = 4 - 2x$ d) $f(x) = \frac{x}{x-1}$

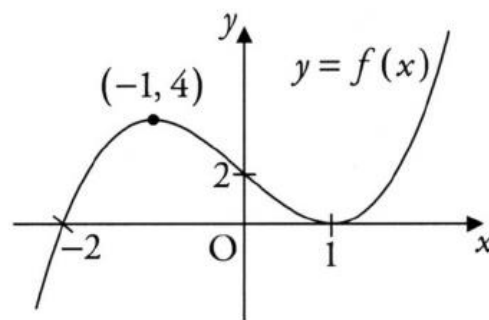
3. a) Draw the graph of the function $f(x) = y = \log_7 x$ for $0 < x < 10$ and on the same diagram sketch its inverse.

b) State the inverse function.

4. Functions k and h are defined on the set of real numbers by $k(x) = \frac{2x-5}{3}$ and $h(x) = \frac{3x+5}{2}$. Find $k(h(x))$. What can you say about functions k and h ?

5.

The graph of $y = f(x)$ is shown below.



Sketch the graph of $y = 4 - f(x+1)$, showing the effect on the four labelled points.

6. Sketch the graph of $y = 3\sin\left(2\theta - \frac{\pi}{3}\right) + 1$ for $0 < \theta < 2\pi$.

7. The functions f and g , defined on a suitable domain, are given by

$$f(x) = \frac{1}{x^2 - 16} \text{ and } g(x) = x - 3.$$

a) Find $k(x) = f(g(x))$, in its simplest form.

b) State a suitable domain for k .