



Higher Mathematics

Inverse Functions - Solutions

Marks are indicated in brackets after each question number

2015 Paper 1 Question 5, (2) (1)

a) $g(x) = 6 - 2x$

$$y = 6 - 2x$$

Interchange x & y to give

$$x = 6 - 2y$$

Solve for y

$$y = 3 - \frac{1}{2}x$$

$$\text{So, } g^{-1}(x) = 3 - \frac{1}{2}x.$$

b) $g(g^{-1}(x)) = x$ since g and g^{-1} are inverses of each other.

2016 Paper 1 Question 6, (3) (1)

a) $f(x) = 3x + 5$

Let $y = 3x + 5$

Swap x & y to give

$$x = 3y + 5$$

$$y = \frac{x-5}{3}$$

$$\text{So, } f^{-1}(x) = \frac{x-5}{3}.$$

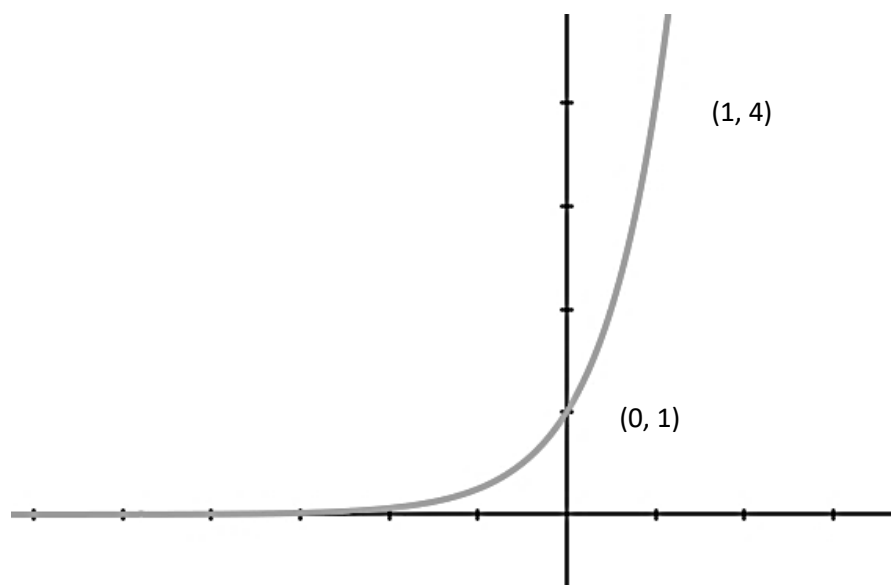
b) $g^{-1}(7) = 2$



2016 Paper 1 Question 10, (2)

The point $(1, 0)$ on the graph of $f(x)$ is transformed to $(0, 1)$ on the graph of $f^{-1}(x)$.

The point $(4, 1)$ on the graph of $f(x)$ is transformed to $(1, 4)$ on the graph of $f^{-1}(x)$.



2017 Paper 1 Question 6, (3)

$$h(x) = x^3 + 7$$

Let $y = h(x)$

$$y = x^3 + 7$$

Swapping x & y gives

$$x = y^3 + 7$$

$$y^3 = x - 7$$

$$y = \sqrt[3]{x - 7}$$

$$\text{So, } h^{-1}(x) = \sqrt[3]{x - 7}.$$

**2018 Paper 1 Question 2, (3)**

$$g(x) = \frac{1}{5}x - 4$$

$$y = \frac{1}{5}x - 4$$

$$5y = x - 20$$

$$x = 5y + 20$$

$$\text{So, } g^{-1}(x) = 5x + 20.$$

2019 Paper 2 Question 8, (3) (1)

$$\text{a) } f(x) = \sqrt[3]{x} + 8$$

$$y = \sqrt[3]{x} + 8$$

$$y - 8 = \sqrt[3]{x}$$

$$x = (y - 8)^3$$

$$\text{So, } f^{-1}(x) = (x - 8)^3$$

b) The domain of $f^{-1}(x)$ is the range of $f(x)$

$$f(1) = 9$$

$$f(1000) = 18$$

So, the range of $f(x)$ is $9 \leq x \leq 18$

Hence, the domain of $f^{-1}(x)$ is $9 \leq x \leq 18, x \in \mathbb{R}$.

2022 Paper 1 Question 3, (3)

$$h(x) = 4 + \frac{1}{3}x$$

$$y = 4 + \frac{1}{3}x$$

$$3y = 12 + x$$

$$x = 3y - 12$$

$$\text{So, } h^{-1}(x) = 3x - 12$$

**2023 Paper 2 Question 6, (3)**

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

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

Swap x and y to give

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

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

$$y(x - 3) = 2$$

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

$$\text{So, } f^{-1}(x) = \frac{2}{x - 3}$$

2024 Paper 1 Question 5, (3)

$$h(x) = 2x^3 - 7$$

$$y = 2x^3 - 7$$

$$y - 7 = 2x^3$$

$$x^3 = \frac{y - 7}{2}$$

$$x = \sqrt[3]{\frac{y - 7}{2}}$$

$$\text{So, } h^{-1}(x) = \sqrt[3]{\frac{x - 7}{2}}$$

2025 Paper 2 Question 4, (3)

$$g(x) = (x - 4)^3$$

$$y = (x - 4)^3$$

$$\sqrt[3]{y} = x - 4$$

$$x = \sqrt[3]{y} + 4$$

$$\text{So, } g^{-1}(x) = \sqrt[3]{x} + 4$$



2026 Paper 2 Question 3, (3)

$$g(x) = \frac{1}{5}x + 6$$

$$y = \frac{1}{5}x + 6$$

$$y - 6 = \frac{1}{5}x$$

$$5y - 30 = x$$

$$g^{-1}(x) = 5x - 30$$