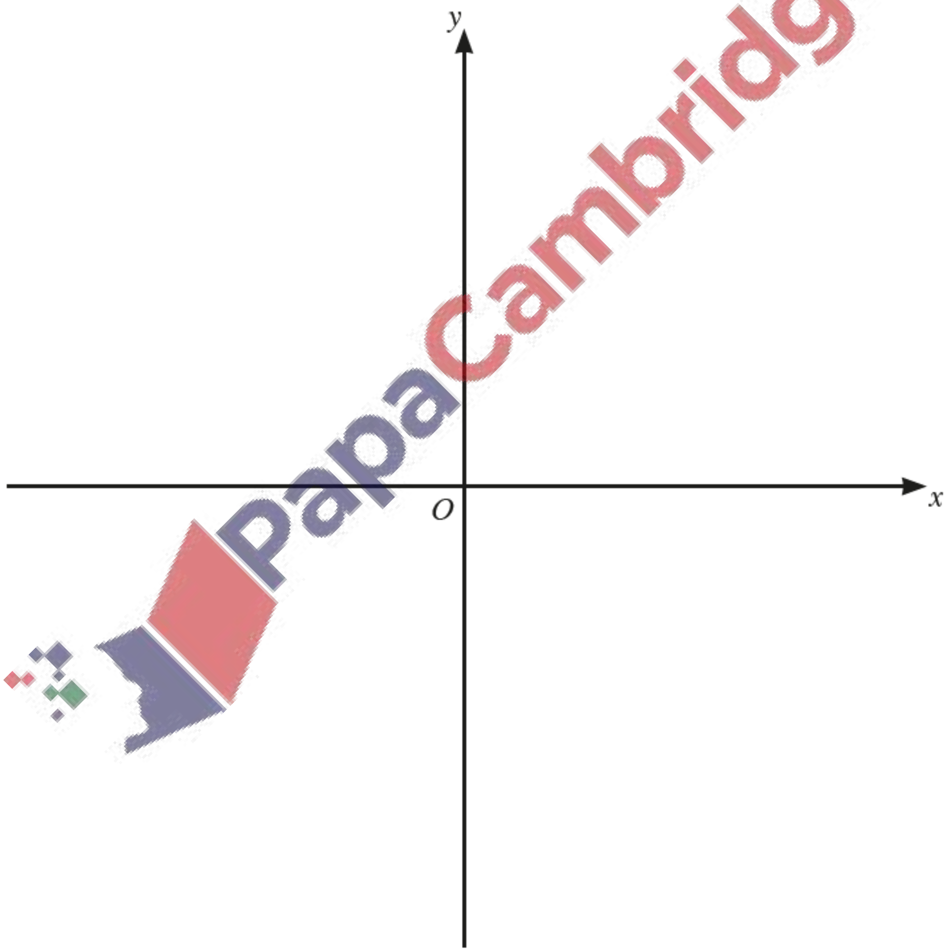
1. Nov/2020/Paper_12/No.6

$$f(x) = x^2 + 2x - 3 \quad \text{for } x \geqslant -1$$

(a) Given that the minimum value of $x^2 + 2x - 3$ occurs when $x = -1$, explain why $f(x)$ has an inverse. [1]

(b) On the axes below, sketch the graph of $y = f(x)$ and the graph of $y = f^{-1}(x)$. Label each graph and state the intercepts on the coordinate axes.



[4]

2. Nov/2020/Paper_13/No.3

(a) $\mathrm{f}(x) = 4\ln(2x-1)$

(i) Write down the largest possible domain for the function f. [1]

(ii) Find $\mathrm{f}^{-1}(x)$ and its domain. [3]

(b)

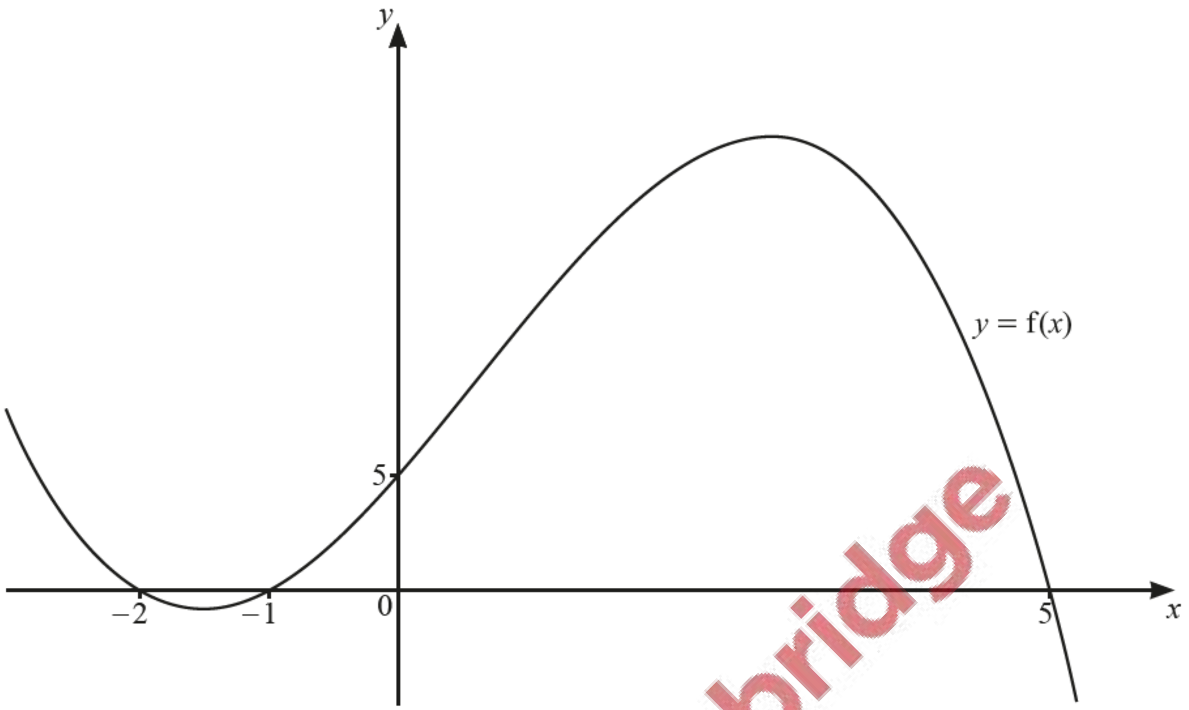
$$\mathrm{g}(x) = x+5 \quad \text{for } x \in \mathbb{R}$$

$$\mathrm{h}(x) = \sqrt{2x-3} \quad \text{for } x \geqslant \frac{3}{2}$$

Solve $\mathrm{gh}(x) = 7$. [3]

3. June/2020/Paper_11/No.1

The diagram shows the graph of a cubic curve $y = f(x)$.



(a) Find an expression for $f(x)$. [2]

(b) Solve $f(x) \leqslant 0$. [2]

4. June/2020/Paper_12/No.5

$$f : x \mapsto (2x+3)^2 \quad \text{for } x > 0$$

(a) Find the range of f. [1]

(b) Explain why f has an inverse. [1]

(c) Find f^{-1}. [3]

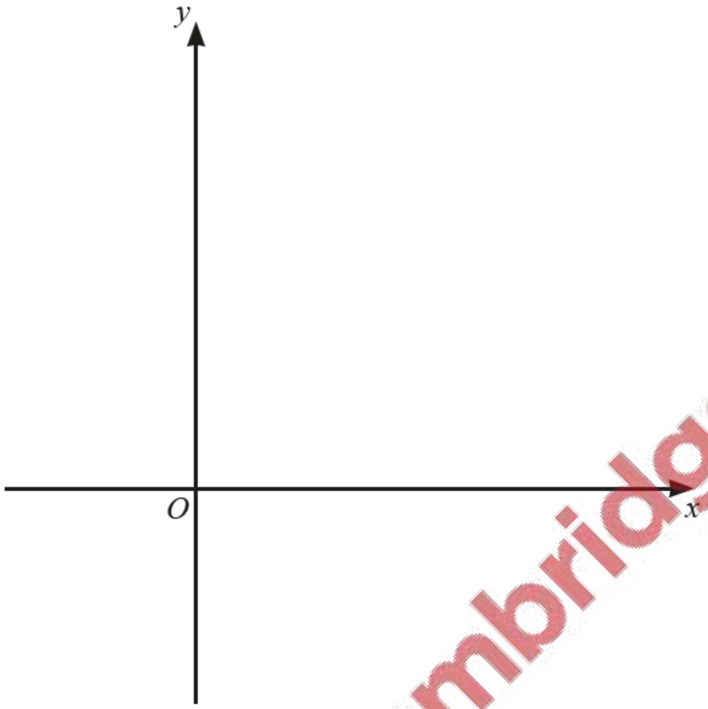
(d) State the domain of f^{-1}. [1]

(e) Given that $g : x \mapsto \ln(x+4)$ for $x > 0$, find the exact solution of $fg(x) = 49$. [3]

5. June/2020/Paper_21/No.11

The function f is defined by $f(x) = \ln(2x+1)$ for $x \geqslant 0$.

(a) Sketch the graph of $y = f(x)$ and hence sketch the graph of $y = f^{-1}(x)$ on the axes below. [3]



The function g is defined by $g(x) = (x-4)^2 + 1$ for $x \leqslant 4$.

(b) **(i)** Find an expression for $g^{-1}(x)$ and state its domain and range. [4]

(ii) Find and simplify an expression for $fg(x)$. [2]

(iii) Explain why the function gf does not exist. [1]