Functions 1

1) Consider the functions $f : x \mapsto 4(x-1)$ and $g : x \mapsto \frac{6-x}{2}$.

(a) Find g^{-1}.

(b) Solve the equation $(f \circ g^{-1})(x) = 4$.

2) The function f is given by $f(x) = x^2 - 6x + 13$, for $x \geq 3$.

(a) Write $f(x)$ in the form $(x-a)^2 + b$.

(b) Find the inverse function f^{-1}.

(c) State the domain of f^{-1}.

3) Let $f(x) = \frac{8}{x}$ and $g(x) = x^2$.

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

(b) (i) Write down $(f^{-1} \circ g)(x)$.

(ii) Solve the equation $(f^{-1} \circ g)(x) = x$.

4) Let $f(x) = 2x + 1$ and $g(x) = 3x^2 - 4$.

Find

(a) $f^{-1}(x)$;

(b) $(g \circ f)(-2)$;

(c) $(f \circ g)(x)$.

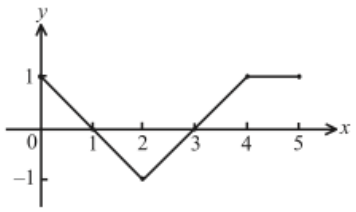
5) Consider the functions $f(x) = 2x$ and $g(x) = \frac{1}{x-3}$, $x \neq 3$.

(a) Calculate $(f \circ g)(4)$.

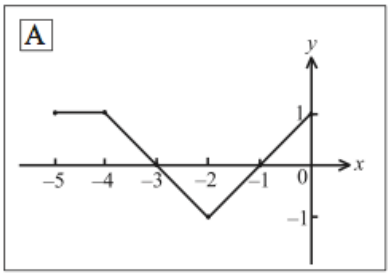
(b) Find $g^{-1}(x)$.

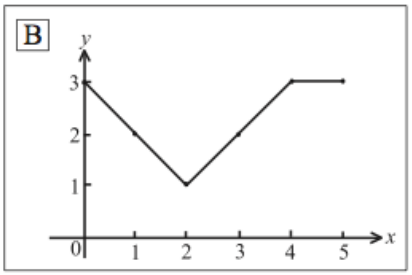
(c) Write down the domain of g^{-1}.

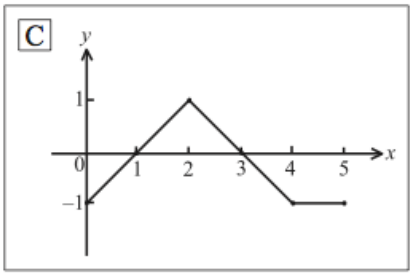
6) The following diagram shows part of the graph of $f(x)$.

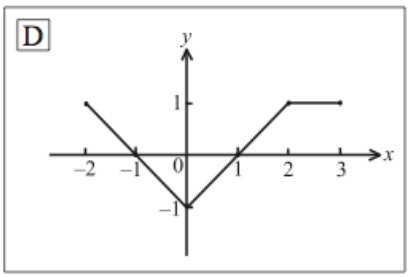


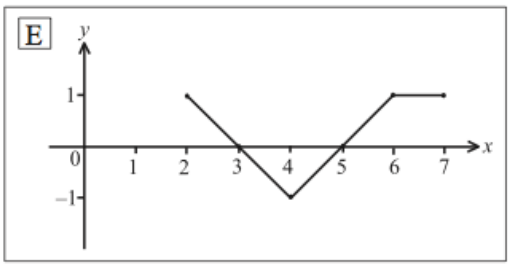
Consider the five graphs in the diagrams labelled A, B, C, D, E below.











(a) Which diagram is the graph of $f(x+2)$?

(b) Which diagram is the graph of $-f(x)$?

(c) Which diagram is the graph of $f(-x)$?

7) Let $f(x)=x^3-4$ and $g(x)=2x$.

(a) Find $(g\circ f)(-2)$.

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

8) Consider the functions f and g where $f(x)=3x-5$ and $g(x)=x-2$.

(a) Find the inverse function, f^{-1}. *[3 marks]*

(b) Given that $g^{-1}(x)=x+2$, find $(g^{-1}\circ f)(x)$. *[2 marks]*

(c) Given also that $(f^{-1}\circ g)(x)=\frac{x+3}{3}$, solve $(f^{-1}\circ g)(x)=(g^{-1}\circ f)(x)$. *[2 marks]*