Exercises [A]

1. $f = \{(-1, 3), (2, 4), (5, 6)\}$. (a) Write the function f^{-1} which is the inverse of f. (b) Evaluate $f^{-1}(f(5))$. (c) Draw the graphs of f and f^{-1}.
2. $f = \{(1, 2), (2, 3), (3, 4), (4, 5)\}$. (a) Write the function f^{-1}. (b) Evaluate $f(f^{-1}(3))$. (c) Draw the graphs of f and f^{-1}.
3. $g = \{(1, 3), (2, 4), (3, 6), (4, 3)\}$. (a) Write the set of ordered pairs g obtained by interchanging the first and second elements of the pairs in g. (b) Why is g not a function? (c) Draw the graph of g.
4. f is defined by $y = 2x$. (a) Find the rule which defines f^{-1}. (b) Draw the graphs of f and f^{-1}.
5. f is defined by $y = x + 2$. (a) Find the rule which defines f^{-1}. (b) Draw the graphs of f and f^{-1}.
6. f is defined by $y = 3x - 5$. Find the rule which defines f^{-1}.
7. Does $y = |x|$ define a function g? Draw the graph of $y = |x|$. Is there a function g^{-1}?
8. f is defined by $y = 8 - 4x$. Find the rule which defines f^{-1}.
9. The rule $y = x^2$ defines a function F with domain the set of real numbers. (a) Sketch the graph of F. (b) Show that there is no function which is the inverse of F.
10. A function f is defined by the rule $y = x^2$ with domain the set of non-negative real numbers. (a) Sketch the graph of f. (b) Is f a one-to-one correspondence? (c) Write the rule which defines the function f^{-1}. (d) Sketch the graph of f^{-1}.
11. List the ordered pairs of a function f such that $f^{-1} = f$.
12. Write a rule for a function which is its own inverse (a) when the function is linear, (b) when the function is not linear.
13. If $f(x) = ax + b$, $ab \neq 0$, which of the following are true statements?

    (a) $f(x + h) - f(x) = ah$, all x. (b) $f\left(\frac{1}{x}\right) = \frac{1}{f(x)}$ when $x \neq 0, f(x) \neq 0$

    (c) $f(x^2) = [f(x)]^2$ for all x. (d) $f^{-1}(x) = \frac{1}{a}(x - b)$ for all x.

    (e) $\frac{f(x_1)}{f(x_2)} = \frac{x_1}{x_2}$ when $x_2 \neq 0, f(x_2) \neq 0$. (f) $f(|x|) = |f(x)|$ for all x.

    (g) $f(x_1 + x_2) = f(x_1) + f(x_2)$ for all x_1 and x_2.

    (h) $f(x_1 x_2) = f(x_1) \cdot f(x_2)$ for all x_1 and x_2.
14. Repeat Exercise 13 with $f(x) = ax$, $a \neq 0$.

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1. (a) $\{(3, -1), (4, 2), (6, 5)\}$ (b) 5 5. (a) $x - 2$ 7. Yes; No
11. $\{(x, y): x = y, x, y \in R\}$
13. (a) T (b) F (c) F (d) T (e) F (f) F (g) F (h) F