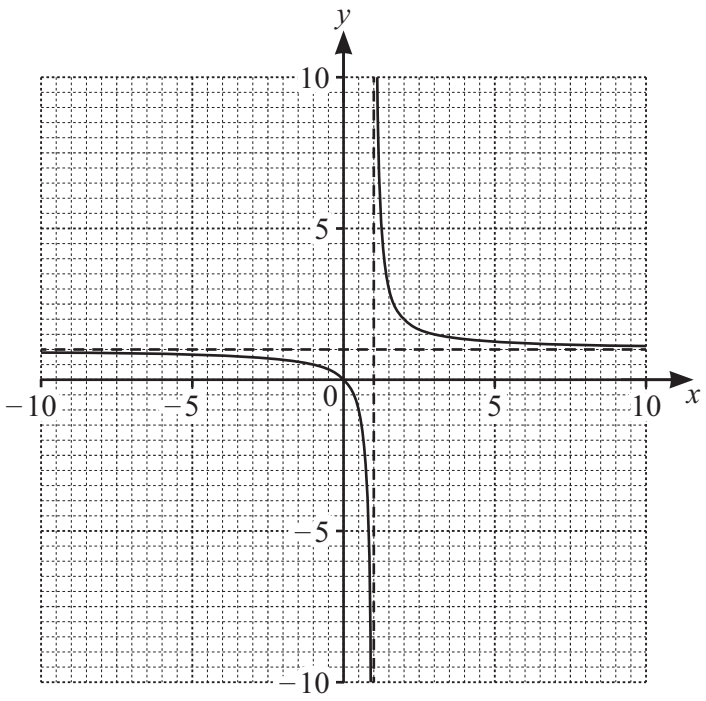
11 **(a)** $f(x) = \frac{x}{x-1}$ for $-10 \leqslant x \leqslant 10, x \neq 1$.

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



(i) Use the diagram to explain why f is a function. [1]

(ii) Find $ff(x)$, giving your answer in its simplest form. [2]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

(iii) Using your answer to **part (ii)** state the relationship between the functions f and f^{-1}. [1]

(iv) Explain how the diagram shows the relationship between f and f^{-1}. [1]

(b) A function g is defined by $g(x) = \frac{x}{x-1}$ for $x \geqslant 2$. Find the range of g. [1]

(c) A function h is defined by $h(x) = \frac{2x}{3x+1}$ for the largest possible domain. State the domain of h. [1]

Question 12 is printed on the next page.

DO NOT WRITE IN THIS MARGIN

12 Two arithmetic progressions, A and B, each have 100 terms. Their terms are denoted by $a_1, a_2, a_3, a_4, \ldots a_{100}$ and $b_1, b_2, b_3, b_4, \ldots b_{100}$ respectively.

It is given that $a_1 = b_{100} = 1$ and $a_{100} = b_1 = 298$.

(a) Find n such that $a_n - b_n = 45$. [6]

(b) Find the smallest m such that $a_m > 2b_m$. [3]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of Cambridge Assessment. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which is a department of the University of Cambridge.