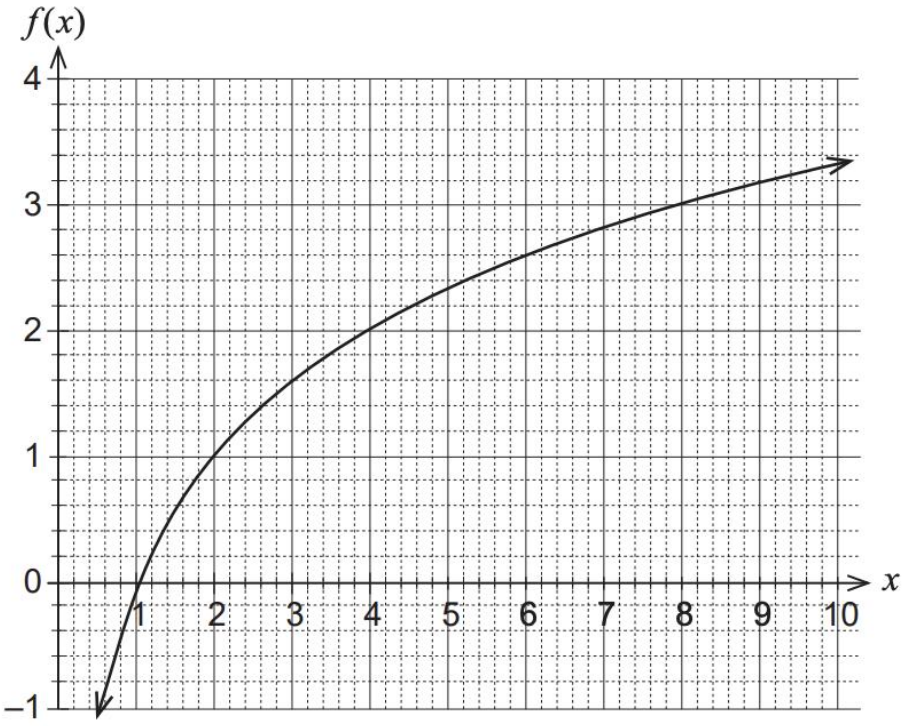
Question 4 **(12 marks)**

The graph of the function $f(x) = \log_2(x)$ is shown below.

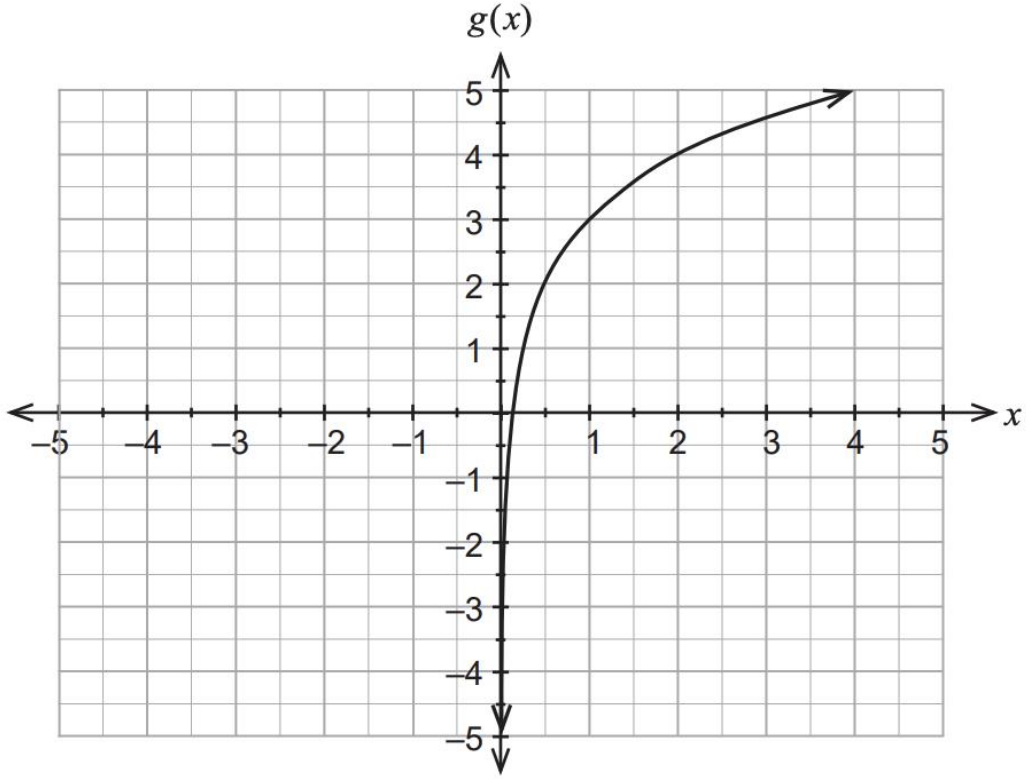


(a) Using the graph:

(i) solve $\log_2(x-5) = 3$. (2 marks)

(ii) determine $\sqrt{7}$, correct to one decimal place. (Hint: let $x = \sqrt{7}$.) (3 marks)

(b) The function $f(x) = \log_2(x)$ is translated to give the new function $g(x)$, which is shown in the graph below.



Determine the equation for $g(x)$. (2 marks)

(c) (i) Show that $\log_2\left(\frac{1}{x-1}\right) = -\log_2(x-1)$. (2 marks)

(ii) Hence sketch the graph of $h(x) = \log_2\left(\frac{1}{x-1}\right)$ on the axes below. (3 marks)