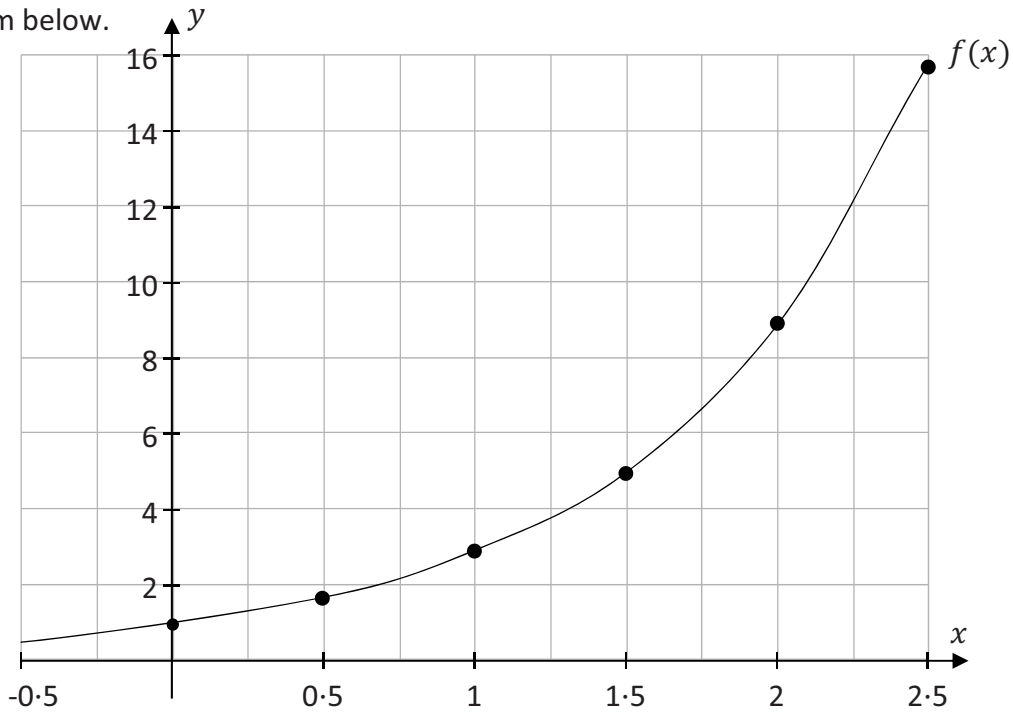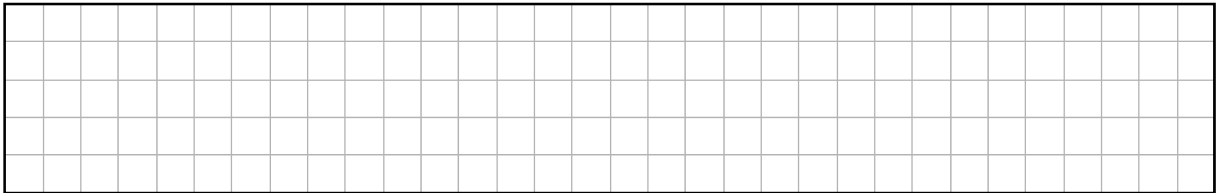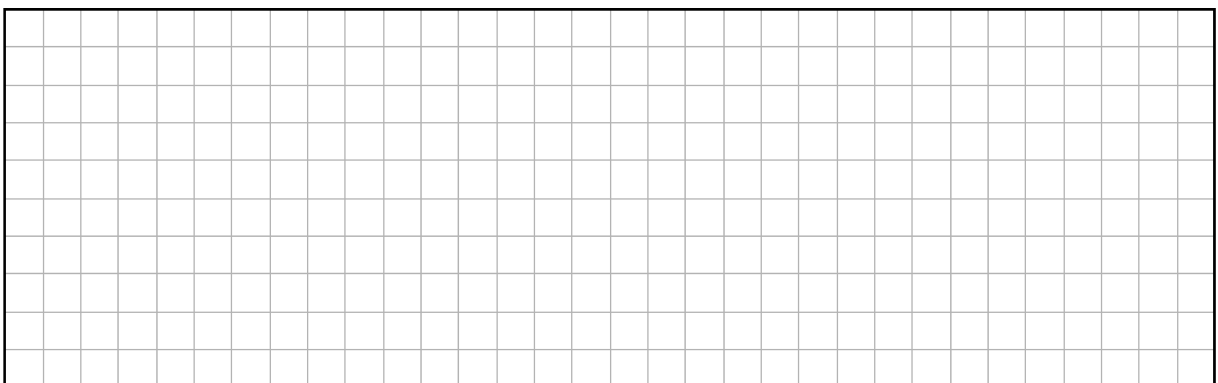**Question 2** **(25 marks)**

The graph of the function $f(x) = 3^x$, where $x \in \mathbb{R}$, cuts the y-axis at $(0, 1)$ as shown in the diagram below.

(a) (i) Draw the graph of the function $g(x) = 4x + 1$ on the diagram.

(ii) Use substitution to verify that $f(x) < g(x)$, for $x = 1\cdot9$.

(b) Prove, using induction, that $f(n) \geq g(n)$, where $n \geq 2$ and $n \in \mathbb{N}$.