6 **(a)** It is given that $\mathrm{f} : x \to 2x^2$ for $x \geqslant 0$,

$\mathrm{g} : x \to 2x + 1$ for $x \geqslant 0$.

Each of the expressions in the table can be written as one of the following.

f' f'' g' g'' fg gf f^2 g^2 f^{-1} g^{-1}

Complete the table. The first row has been completed for you. [5]

Expression	Function notation
2	g'
0	
$4x$	
$8x^2 + 8x + 2$	
$4x + 3$	
$\frac{x-1}{2}$	

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(b) It is given that $\mathrm{h}(x) = (x-1)^2 + 3$ for $x \geqslant a$. The value of a is as small as possible such that h^{-1} exists.

(i) Write down the value of a. [1]

(ii) Write down the range of h. [1]

(iii) Find $\mathrm{h}^{-1}(x)$ and state its domain. [3]

7 A curve has equation $y = \dfrac{(2x+1)^{\frac{3}{2}}}{x+5}$ for $x \geqslant 0$.

(a) Show that $\dfrac{\mathrm{d}y}{\mathrm{d}x} = \dfrac{(2x+1)^{\frac{1}{2}}}{(x+5)^2}(Ax+B)$, where A and B are integers to be found. [4]

(b) Show that there are no stationary points on this curve. [1]