4. The function f is defined by

$$\mathrm{f}(x) = \frac{12x}{3x + 4} \qquad x \in \mathbb{R},\ x \geqslant 0$$

(a) Find the range of f.

(2)

(b) Find f^{-1}.

(3)

(c) Show, for $x \in \mathbb{R}$, $x \geqslant 0$, that

$$\mathrm{ff}(x) = \frac{9x}{3x + 1}$$

(3)

(d) Show that $\mathrm{ff}(x) = \frac{7}{2}$ has no solutions.

(2)