13 The function f is defined by

$$f(x) = \frac{2x+3}{x-2} \qquad x \in \mathbb{R},\ x \neq 2$$

13 (a) (i) Find f^{-1}

[3 marks]

13 (a) (ii) Write down an expression for $ff(x)$.

[1 mark]

13 (b) The function g is defined by

$$g(x) = \frac{2x^2 - 5x}{2} \qquad x \in \mathbb{R},\ 0 \leq x \leq 4$$

13 (b) (i) Find the range of g.

[3 marks]

13 (b) (ii) Determine whether g has an inverse.

Fully justify your answer.

[2 marks]

13 (c) Show that

$$gf(x) = \frac{48 + 29x - 2x^2}{2x^2 - 8x + 8}$$

[4 marks]

13 (d) It can be shown that fg is given by

$$fg(x) = \frac{4x^2 - 10x + 6}{2x^2 - 5x - 4}$$

with domain $\{x \in \mathbb{R} : 0 \leq x \leq 4,\ x \neq a\}$

Find the value of a.

Fully justify your answer.

[2 marks]