The function **f** and **g** are defined as follows

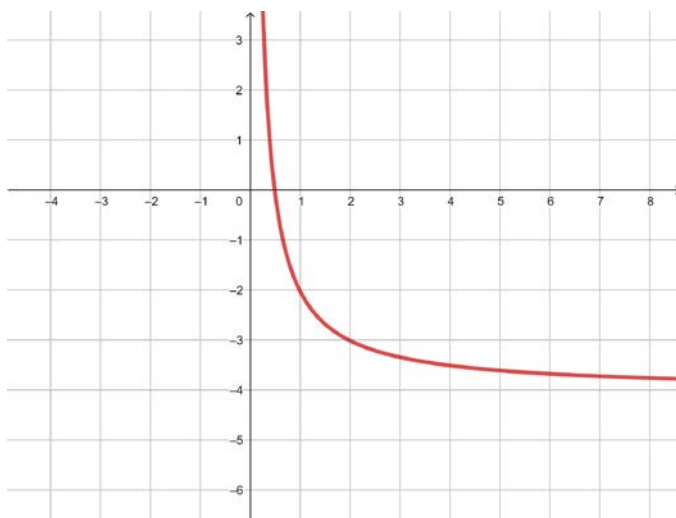$$f(x) = 3x^2, x \in \mathbb{R}$$

$$g(x) = \frac{2}{x} - 4 , x \in \mathbb{R}, x > 0$$

a) Find the range of **g**

b) Find g^{-1}

c) Solve $gf(x) = 2$

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a)   Range : $g(x) > -4$

b)   Let $y = \frac{2}{x} - 4$

Interchange x and y

$$x = \frac{2}{y} - 4$$

Make y the subject

$$x + 4 = \frac{2}{y}$$

$$y = \frac{2}{x + 4}$$

Domain of g^{-1} is range of g

$$g^{-1}(x) = \frac{2}{x + 4}, x \in \mathbb{R}, x > 4$$

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c)

$$gf(x) = \frac{2}{3x^2} - 4$$

Solve $gf(x) = 2$

$$\frac{2}{3x^2} - 4 = 2$$

$$\frac{2}{3x^2} = 6$$

$$\frac{1}{9} = x^2$$

$$x = \pm\sqrt{\frac{1}{9}}$$

Since domain of g(x) is $x > 0$

$$x = \frac{1}{3}$$