

**Question 1** (8 marks)

Let  $f(x) = \frac{x^2 - 1}{x + 2}$  and  $g(x) = x - 2$ .

(a) Show that  $f(x) = g(x) + \frac{3}{x + 2}$ .

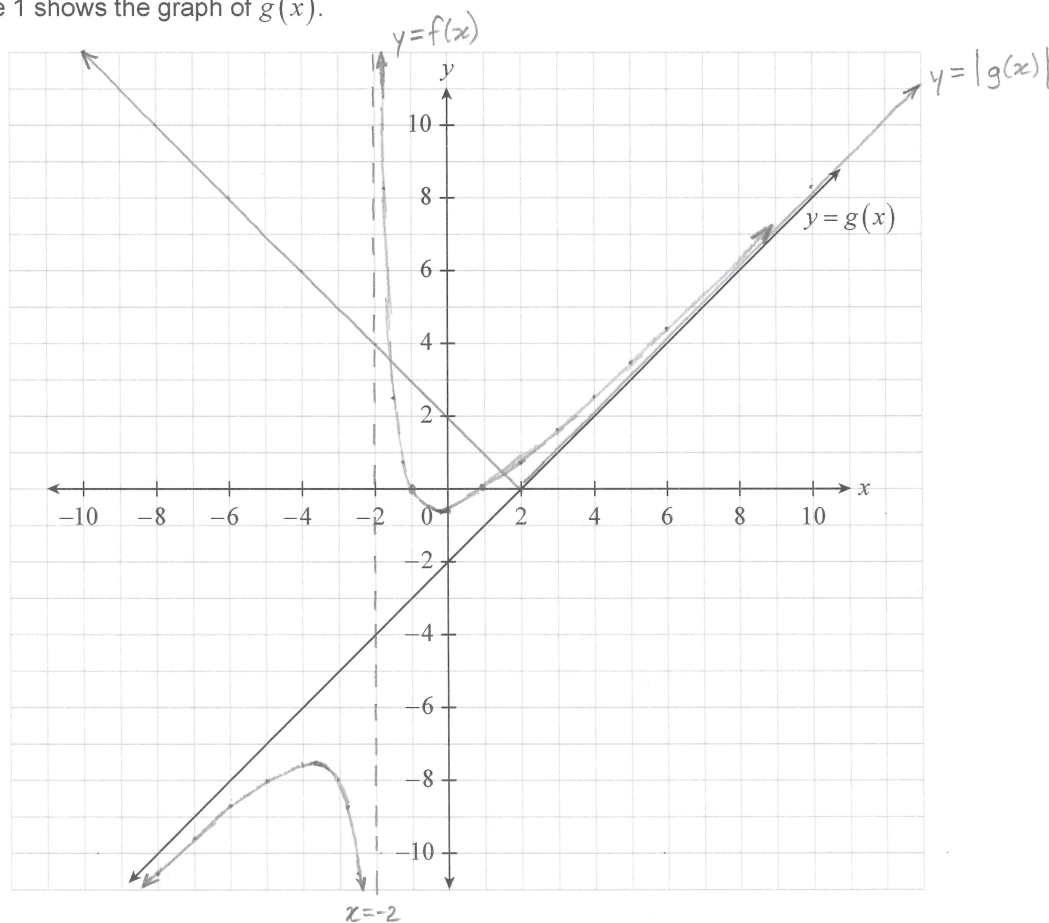
$$g(x) + \frac{3}{x+2} = \frac{(x-2)(x+2)}{x+2} + \frac{3}{x+2}$$

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

$$= \frac{x^2 - 1}{x+2}$$

(1 mark)

(b) Figure 1 shows the graph of  $g(x)$ .



**Figure 1**

On the axes in Figure 1, sketch and label graphs of each of the functions below, including any asymptotes.

Clearly show the behaviour of the functions near any asymptotes.

(i)  $f(x)$  (3 marks)

(ii)  $|g(x)|$  (1 mark)

