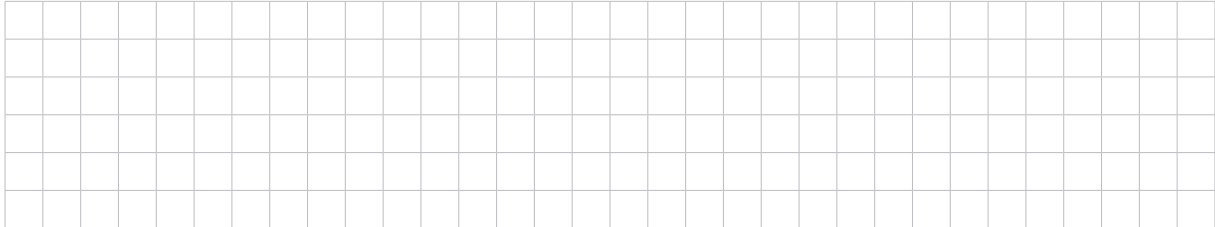**Question 1**   (8 marks)

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

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

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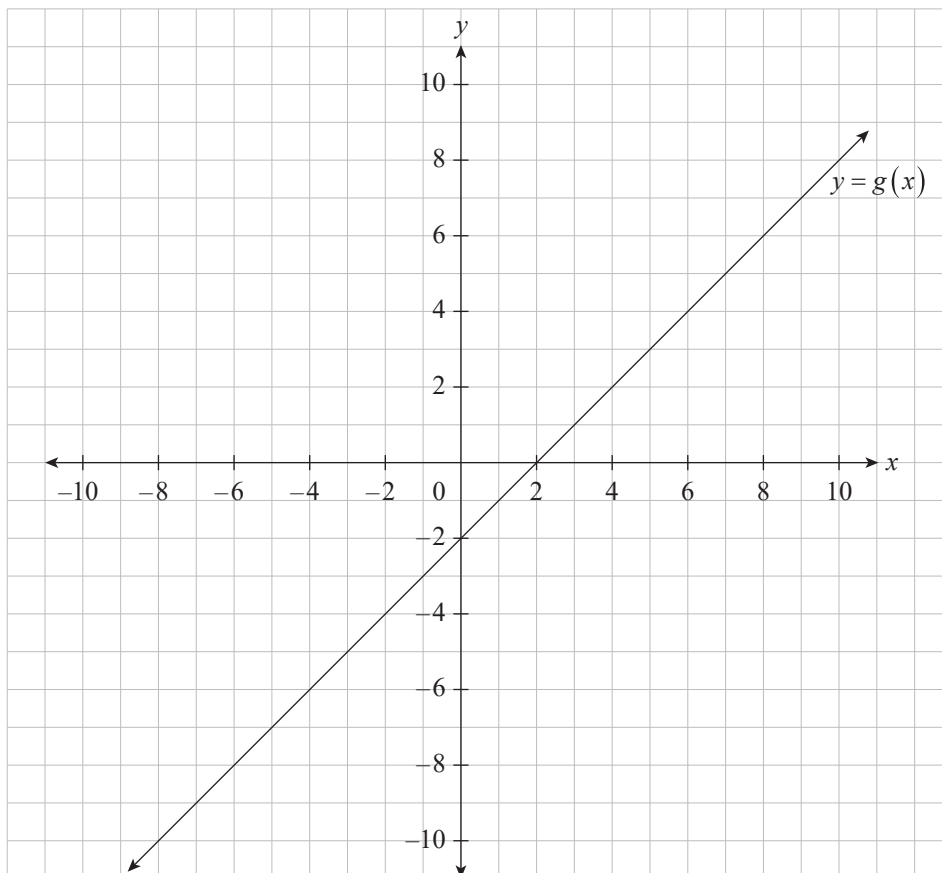
(b) Figure 1 shows the graph of $g(x)$.

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) $\left|g(x)\right|$ (1 mark)

(c) Consider each of the following equations.

State whether solutions exist.

Where solutions exist, state the number of solutions, and find the value(s).

(i) $f(x) = g(x)$

(1 mark)

(ii) $f(x) = |g(x)|$

(2 marks)

PLEASE TURN OVER