1. Take f to be the function given by

$$f(x) = \begin{cases} 3 & \text{if } -3 \leq x < -1 \\ \left(\frac{1}{2}\right)^{x+1} + 1 & \text{if } -1 \leq x < 1 \\ -2x + 3 & \text{if } 1 \leq x < 3. \end{cases}$$

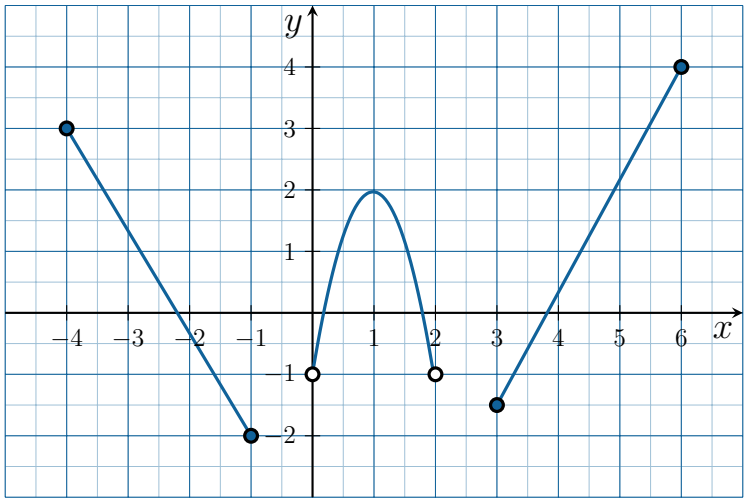
Identify its domain.

2. Take f to be the function given by

$$f(x) = \begin{cases} 3 & \text{if } -3 \leq x < -1 \\ \left(\frac{1}{2}\right)^{x+1} + 1 & \text{if } -1 \leq x < 1 \\ -2x + 3 & \text{if } 1 \leq x < 3. \end{cases}$$

Sketch f.

3. Take f to be the piecewise function whose graph is given below.



It is a piecewise function made up of linear and quadratic functions. Determine a formula for f.

4. Take f and g to be the functions given by

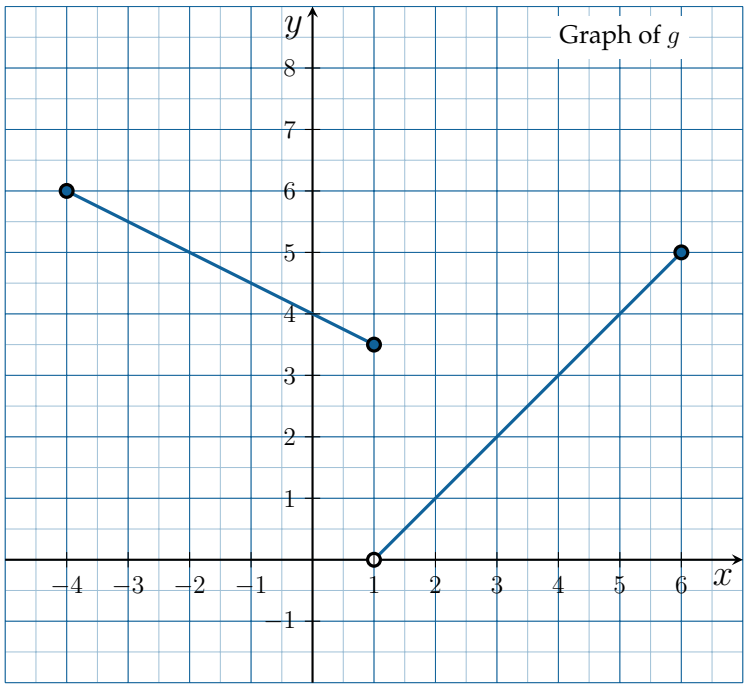
$$f(x) = \begin{cases} x - 3 & \text{if } x \leq 4 \\ -x + 9 & \text{if } x > 4 \end{cases} \quad \text{and} \quad g(x) = \begin{cases} 3x - 2 & \text{if } x < 6 \\ 3x - 16 & \text{if } x \geq 6. \end{cases}$$

Solve the inequality $f(x) > g(x)$ without using graphing software. Write your answer as a union of intervals.

5. Take f to be the function given by

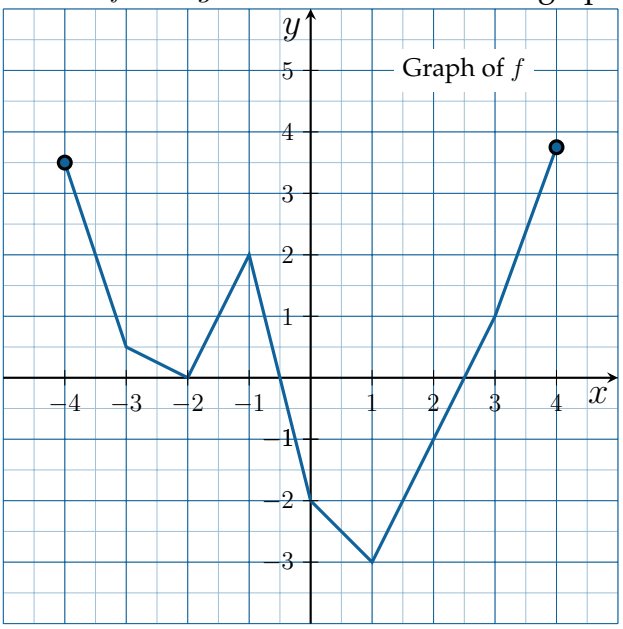
$$f(x) = \begin{cases} 3x & \text{if } x \leq 2 \\ -x^2 & \text{if } 4 < x \leq 5 \end{cases}$$

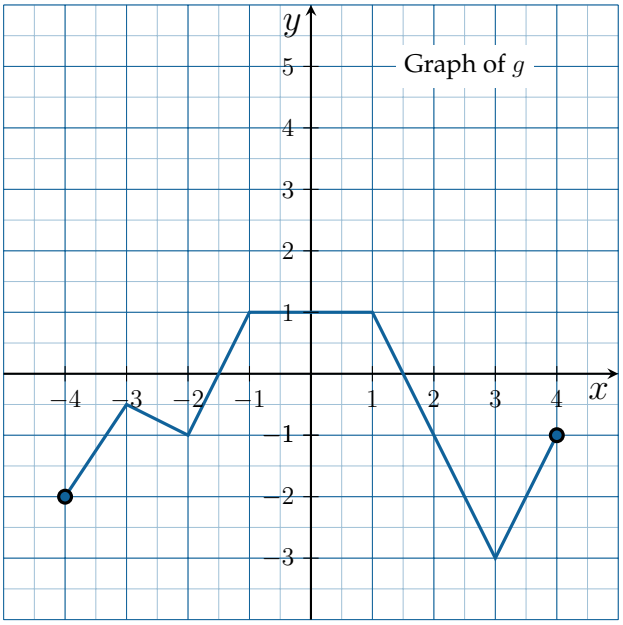
and g to be the piecewise linear function whose graph is given below.



Write $f \circ g$ as a piecewise function and state its domain.

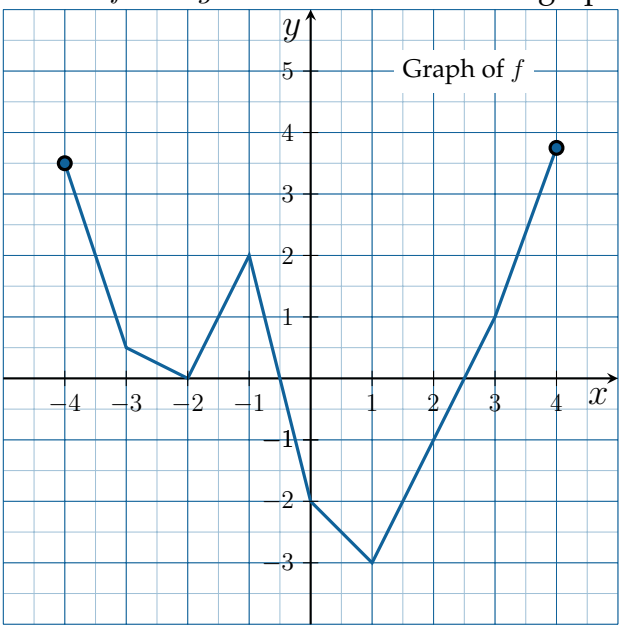
6. Take f and g to be functions whose graphs are given below.

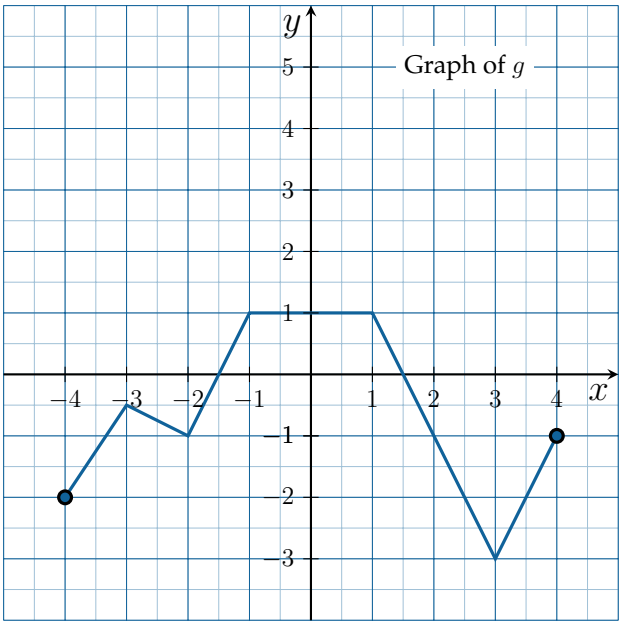




Solve the inequality $f(x)g(x) \geq 0$.

7. Take f and g to be functions whose graphs are given below.





Solve the inequality $f(x)g(x) \leq 0$.