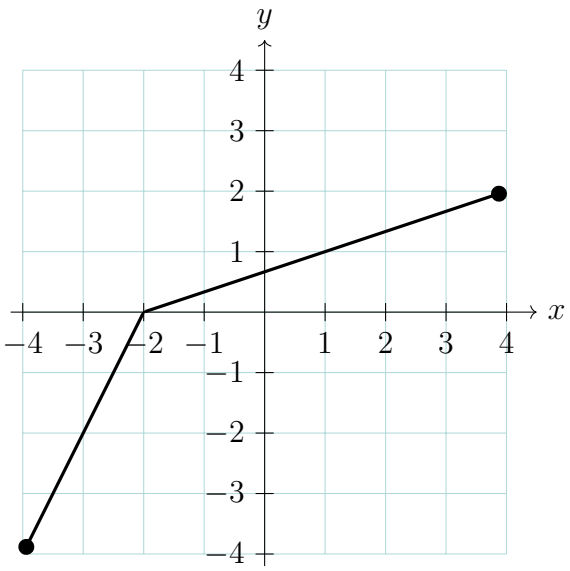
Name:
Group 1
Result:

1. *(7 points)*

The diagram below shows the graph of $f(x)$.



a) State the domain and range of $f(x)$.

b) Find the value of a in each of the following:

(i) $a = f(4)$

(ii) $f(a) = 0$

c) Calculate $(f \circ f)(-3)$.

d) On the same diagram sketch the graph of $f^{-1}(x)$.

2. *(9 points)*

Consider the following functions:

$$f(x) = 3x - 5 \qquad g(x) = x^2 + 2x + 4 \qquad h(x) = \frac{3x - 1}{2x + 4}$$

(a) Calculate $(g \circ f)(2)$.

(b) Find and simplify the formula for $(h \circ f)(x)$.

(c) Solve the equation:

$$f^{-1}(x) = 7$$

(d) Find $h^{-1}(x)$.

(e) Find the largest possible domain in the form $x \geqslant k$, so that $g(x)$ has an inverse function. Find $g^{-1}(x)$ and sketch both $g(x)$ (with restricted domain) and $g^{-1}(x)$.

3. *(4 points)*

Find the domain and range of $f(x) = \sqrt{8 - 2x - x^2}$.