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

a) Show that $f \circ g(x) = \frac{x+1}{1-x}$

b) Let $h(x) = \frac{x+1}{1-x}$, for $x < 1$

Find the x and y intercepts of the graph of h

c) Sketch the graph of h

d) Sketch the graph of h^{-1}

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a) $f(x) = 2x + 1$

$$g(x) = \frac{x}{1-x}$$

$$f \circ g(x) = 2\left(\frac{x}{1-x}\right) + 1$$

$$f \circ g(x) = \frac{2x}{1-x} + \frac{1-x}{1-x}$$

$$f \circ g(x) = \frac{2x + 1 - x}{1-x}$$

$$f \circ g(x) = \frac{x+1}{1-x}$$

b) $h(x) = \frac{x+1}{1-x}$

When $x = 0$, $y = \frac{0+1}{1-0}$

$y = 1$

When $y = 0$, $0 = \frac{x+1}{1-x}$
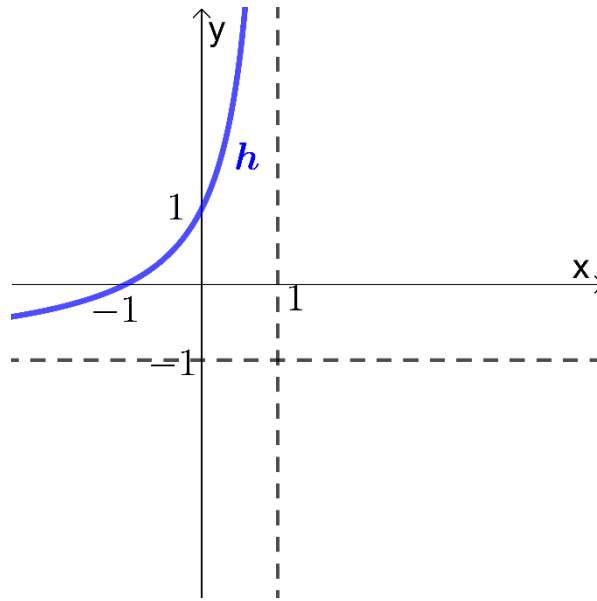
$0 = x + 1$

$x = -1$

c) $h(x) = \frac{x+1}{1-x}$ The graph has

a vertical asymptote at $x = 1$

a vertical asymptote at $y = -1$

In a sketch include

- x intercept
- y intercept
- asymptotes

d) We reflect the graph of y = h in
    the line y = x

INTHINKING