

Pre HL Unit 2 IB Exam style Questions: (1)

#1. $f(x) = |x| - 1$

a) i) $(f \circ g)(1) = 4$

$g(1) = 1 - 1 = 0$ $f(0) = 4$

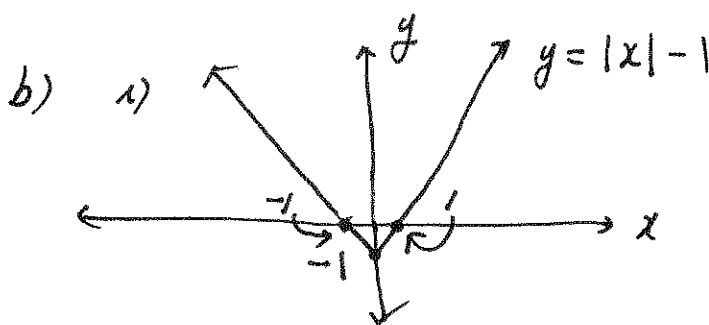
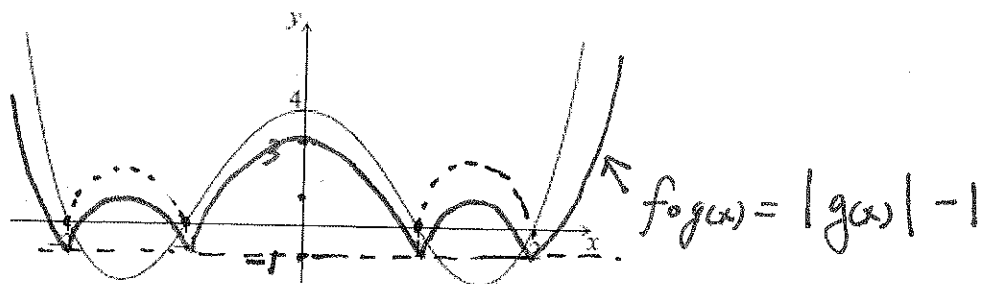
ii) $(f \circ g \circ g)(1)$

$g(1) = 0$

$g(0) = -1$

$f(-1) = 0$

iii) $f \circ g(x) = |g(x)| - 1$

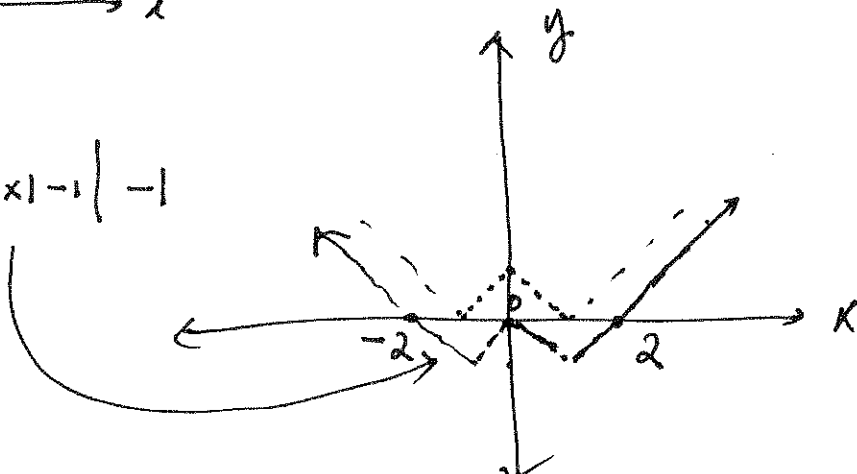


ii) $0 = |x| - 1$

$|x| = 1$ $x = \pm 1$

c) $(f \circ f)(x) = ||x| - 1| - 1$

$x = \pm 2$



#2. a) i) $(g \circ f)(x) = \frac{1}{2x+3}$ $f(x) = 2x+3$ (2)
 $g(x) = \frac{1}{x}$

Domain of $f(x)$: $(-\infty, \infty)$

Domain of $g \circ f(x) \Rightarrow x \neq -\frac{3}{2} \in \mathbb{R}$.

$(-\infty, -\frac{3}{2}) \cup (-\frac{3}{2}, \infty)$

ii) $(f \circ g)(x) = 2(\frac{1}{x}) + 3 = \frac{2}{x} + 3$.

$g(x)$: Domain: $\mathbb{R} \ x \neq 0$.

$(f \circ g)(x)$: $\mathbb{R} \ x \neq 0$.

b) $y = (g^{-1} \circ f \circ g)(x)$

$= \frac{1}{\frac{2}{x} + 3}$

$= \frac{1}{\frac{2}{x} + \frac{3x}{x}} = \frac{1}{\frac{2+3x}{x}}$

$y = \frac{x}{2+3x}$

$\Rightarrow \frac{x}{2+3x} = 2x+3$

$x = (2+3x)(2x+3)$

$x = 6x^2 + 6 + 4x + 9x$

$x = 6x^2 + 13x + 6$

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

$x = \frac{1}{y} \Rightarrow y = \frac{1}{x}$

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

$6x^2 + 12x + 6 = 0$

$6(x^2 + 2x + 1) = 0$

$6(x+1)^2 = 0$

$x = -1 \quad y = 1$ ✓

#3 $f(x) = \sqrt{x-1}$ & $g(x) = x+2$

a) $f^{-1}(3) \Rightarrow 3 = \sqrt{x-1} \Rightarrow x-1 = 9 \Rightarrow \boxed{x=10} = f^{-1}(3)$

$g^{-1}(3) \Rightarrow 3 = x+2 \Rightarrow \boxed{x=1} = g^{-1}(3)$

$\Rightarrow f^{-1}(3) \times g^{-1}(3) = 10 \cdot 1 = \boxed{10}$

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

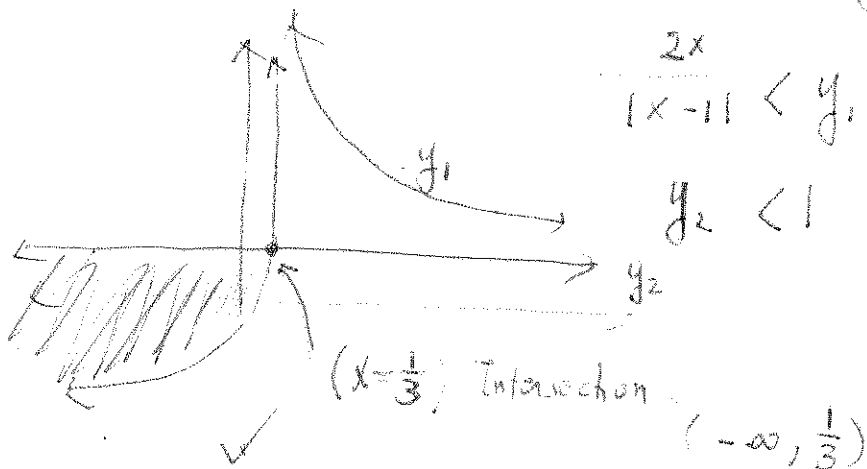
$(f \circ g)^{-1}(3) \Rightarrow 3 = \sqrt{x+1}$

$x+1 = 9$
 $\boxed{x=8} = (f \circ g)^{-1}(3)$

#4

$\frac{2x}{|x-1|} < 1$

graphically



#5

a) (i) $f(-3) = -1$

(ii) $f^{-1}(1) = 0$

(b) Domain of $f^{-1} : [-3, 3]$

(c)

