Exercise 1 Let $g(x) = -x^2$ and $h(x) = 2|x-1| - 1$.

(a) Calculate the following limits.

(i) $\lim\limits_{x \to 1} g(x) = \boxed{-1}$

(ii) $\lim\limits_{x \to 1} h(x) = \boxed{-1}$

(iii) $\lim\limits_{x \to 1} \dfrac{g(x)}{h(x)} = \boxed{1}$

(iv) $\lim\limits_{x \to 1} \dfrac{h(x) - h(4)}{x - 4} = \boxed{2}$

(b) Find the expression for $h(x)$, if $x < 1$.

$h(x) = \boxed{-2}\, x + \boxed{1}$, if $x < 1$.

(c) Find the expression for $h(x)$, if $x \geq 1$.

$h(x) = \boxed{2}\, x - 3$, if $x \geq 1$.

(d) Make the correct choice.
The given inequality, $g(x) \leq h(x)$, is (true $\checkmark$/ not true) for all values of x.

(e) Let f be a function such that $g(x) \leq f(x) \leq h(x)$ for all $0 < x < 2$.

Then $\lim\limits_{x \to 1} f(x) = \boxed{-1}$, by (limit laws/ continuity/ difference law/ quotient law/ the Squeeze Theorem $\checkmark$).

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