Quiz 2 Solutions:

1) $\lim_{x \to c} f(x) = L$ means we can make $f(x)$ very close to L by taking x sufficiently close to c.

2) Find asymptotes, if any.

(i) $f(x) = \dfrac{x^2+1}{x^2-8}$.

Horizontal asymptote at $\boxed{y=1}$

Vertical asymptotes at $\boxed{x=2}$

(ii) $g(x) = \dfrac{x^2-1}{2x^2-8}$

Horizontal asymptote: $y = \frac{1}{2}$

Vertical asymptite: $x = \pm 2$

3) Does limit exist?

(i) $\lim_{x\to 1} \begin{cases} 1-x & x\leq 1 \\ (x-1)^2 & x>1 \end{cases}$

Check left / right hand limits.

* $\lim_{x\to 1^-} f(x) = \lim_{x\to 1} (1-x) = 0$

* $\lim_{x\to 1^+} f(x) = \lim_{x\to 1} (x-1)^2 = 0$

Left and right limits agree so limit exists.

(ii) $\lim_{x\to 0} \frac{|x|}{x}$. Note: if $x>0$, then $\frac{|x|}{x} = \frac{x}{x} = 1$

and if $x<0$, then $\frac{|x|}{x} = \frac{-x}{x} = -1$.

So: $\lim_{x\to 0^-} \frac{|x|}{x} = \lim_{x\to 0^-} -1 = -1$

$\lim_{x\to 0^+} \frac{|x|}{x} = \lim_{x\to 0} 1 = 1$.

Left and right limits do not agree, so <u>limit does not exist</u>.