Math 325. Quiz #9

(1) State the definition for a function $g(x)$ to be *continuous* at $x = b$.

(2) TRUE OR FALSE, and *justify* with a short proof or example:
If $\lim_{x\to 0} f(x)$ does not exist, then $\lim_{x\to 0} 2f(x)$ does not exist.

(3) TRUE OR FALSE, and *justify* with a short proof or example:
If the domain of f is $\mathbb{R}$ and $\lim_{x\to 0} f(x) = 3$, then the sequence $\{f(1/n)\}_{n=1}^{\infty}$ converges to 0.

Bonus: Prove or disprove: If $\lim_{x\to 1} f(x) = 2$ and $\lim_{x\to 2} g(x) = 3$, then $\lim_{x\to 1}(g \circ f)(x) = 3$. (Here, $g \circ f$ denotes composition of functions: $(g \circ f)(x) := g(f(x))$.)