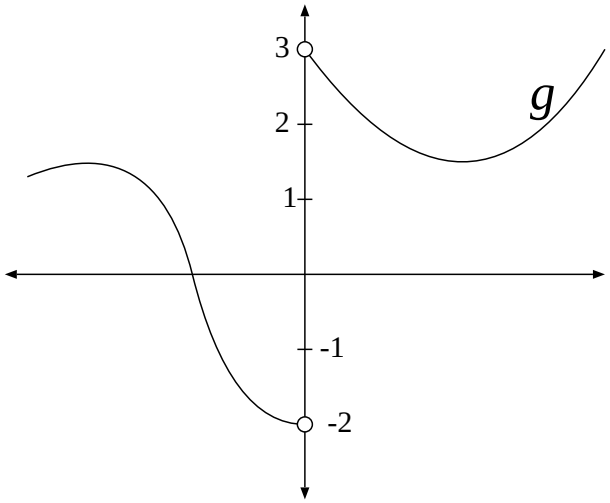
Math 1100 — Calculus, Quiz #2B — 2009-10-01

(40) 1. Let $f(x) := \dfrac{(4+x)^2 - 16}{x}$. Use the 'limit laws' from section 2.3 in the book to compute $\lim\limits_{x \to 0} f(x)$.

Solution: For all $x \neq 0$, we have

$$f(x) \;=\; \frac{(4+x)^2 - 16}{x} \;=\; \frac{16 + 8x + x^2 - 16}{x} \;=\; \frac{8x + x^2}{x} \;=\; 8 + x.$$

Thus, $\lim\limits_{x \to 0} f(x) \;=\; \lim\limits_{x \to 0} 8 + x \;=\; \boxed{8.}$ □



(30) 2. Let $g : \mathbb{R} \longrightarrow \mathbb{R}$ be the function portrayed in the picture. Based on this picture, what are $\lim\limits_{x \nearrow 0} g(x)$ and $\lim\limits_{x \searrow 0} g(x)$?

Solution: $\lim\limits_{x \nearrow 0} g(x) \;=\; \boxed{-2.}$, while $\lim\limits_{x \searrow 0} g(x) \;=\; \boxed{3.}$ □

3. Combine your answers from #1 and #2.

(30) (a) What is $\lim\limits_{x \nearrow 0} (f(x) + g(x))$?

(b) What is $\lim\limits_{x \searrow 0} f(x) \cdot g(x)$?

Solution: (a) $\lim\limits_{x \nearrow 0} (f(x) + g(x)) \;=\; \lim\limits_{x \nearrow 0} f(x) + \lim\limits_{x \nearrow 0} g(x) \;=\; 8 + -2 \;=\; \boxed{6.}$

(b) $\lim\limits_{x \searrow 0} f(x) \cdot g(x) \;=\; \left(\lim\limits_{x \searrow 0} f(x)\right) \cdot \left(\lim\limits_{x \searrow 0} g(x)\right) \;=\; 8 \cdot 3 \;=\; \boxed{24.}$ □