2.3 Calculating limits using the limit laws

This section introduces methods to evaluate limits

1. If the limits $\lim_{x\to a} f(x)$ and $\lim_{x\to a} g(x)$ exits, then
   (a) $\lim_{x\to a}[f(x) \pm g(x)] = \lim_{x\to a} f(x) \pm \lim_{x\to a} g(x)$
   (b) $\lim_{x\to a}[cf(x)] = c \lim_{x\to a} f(x)$
   (c) $\lim_{x\to a}[f(x) \cdot g(x)] = \lim_{x\to a} f(x) \cdot \lim_{x\to a} g(x)$
   (d) $\lim_{x\to a} \frac{f(x)}{g(x)} = \frac{\lim_{x\to a} f(x)}{\lim_{x\to a} g(x)}$, where $\lim_{x\to a} g(x) \neq 0$
2. $\lim_{x\to a}(f^n(x)) = \lim_{x\to a}[(f(x))]^n = [\lim_{x\to a}(f(x))]^n$
3. $\lim_{x\to a}$ constant $=$ constant, and also $\lim_{x\to a} x = a$
4. $\lim_{x\to a} x^n = a^n$, if $n > 0$
5. $\lim_{x\to a} x^{\frac{p}{q}} = a^{\frac{p}{q}}$ as long as the pth-root is defined
6. $\lim_{x\to a} \sqrt[n]{f(x)} = \sqrt[n]{\lim_{x\to a} f(x)}$, for all functions $f(x)$ for which the n^{th}-root is defined.
7. if two functions are the same except at the point a where the limit is evaluated (i.e $f(x) = g(x)$ when $x \neq a$), then $\lim_{x\to a} f(x) = \lim_{x\to a} g(x)$
8. if $f(x) \leq g(x)$, then $\lim_{x\to a} f(x) \leq \lim_{x\to a} g(x)$
9. if $f(x) \geq g(x)$, then $\lim_{x\to a} f(x) \geq \lim_{x\to a} g(x)$
10. Squeeze Theorem: if $f(x) \leq g(x) \leq h(x)$, then $\lim_{x\to a} f(x) \leq \lim_{x\to a} g(x) \leq \lim_{x\to a} h(x)$.
    Particularly, if $\lim_{x\to a} f(x) = \lim_{x\to a} h(x) = L$ for some constant L, then we also obtain $\lim_{x\to a} g(x) = L$.