MATH 2554 : 4.6 - 4.7 Review + A few problems

4.6 Linear Approximation - Important Concepts

— To approximate f near $x = a$, use $f(x) \approx L(x) = f(a) + f'(a)(x - a)$

— To approximate the change in y (Δy) use $\Delta y \approx f'(a)\Delta x$

4.7 L'Hôpital's Rule

Suppose f and g are differentiable on an open interval I containing a with $g'(x) \neq 0$ on I when $x \neq a$. If $\lim_{x\to a} f(x) = \lim_{x\to a} g(x) = 0$, then $\lim_{x\to a} \frac{f(x)}{g(x)} = \lim_{x\to a} \frac{f'(x)}{g'(x)}$ provided the limit on the right exists (or is $\pm\infty$). This rule also applies if $x \to a$ is replaced with $x \to \pm\infty$ or a left/right limit.

Problem 1 $\lim_{x\to\infty} x - \sqrt{x^2 - 1}$

Problem 2 $\lim_{x\to 0^+} x^x$