Mathematics 1110H (Section B) – Calculus I: Limits, Derivatives, and Integrals
Quiz #6
A Little Optimization
Due* just before midnight on Wednesday, 18 October.

REMINDER. While you are allowed to work together and look things up when doing the quizzes and assignments, your submission should be written up entirely by yourself, giving credit to any collaborators or sources that you ended up actually using. *Please show all your steps and simplify your answers as far as practical.*

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

0. What is the domain of $f(x)$, *i.e.* for which values of x is $f(x)$ defined? *[0.5]*

1. Explain why $-1 < f(x) < 1$ for all values of x. *[0.5]*

2. Find $\lim\limits_{x \to -\infty} f(x)$ and $\lim\limits_{x \to \infty} f(x)$. *[1]*

3. Find $f'(x)$. *[1]*

4. Find any and all critical points of $f(x)$. *[0.5]*

5. Find the absolute maximum and minimum values of $f(x)$. *[1.5]*