MATH 1100-A 2008 Quiz 8
Sections 3.9 and 4.1 Nov. 18, 2008

1. Find the absolute maximum and absolute minimum values of

$$f(x) = \frac{x+2}{x^2+5}$$

on the interval $[-3, 3]$.

Solution:

$$\begin{aligned} f'(x) &= \frac{x^2+5-(x+2)2x}{(x^2+5)^2} \\ &= \frac{x^2+5-2x^2-4x}{(x^2+5)^2} \\ &= \frac{5-4x-x^2}{(x^2+5)^2} \\ &= \frac{-(x+5)(x-1)}{(x^2+5)^2} \end{aligned}$$

$$f' = 0 \Leftrightarrow x = -5, x = 1$$

In the interval $[-3, 3]$, the critical number is 1. We have

$$\begin{aligned} f(-3) &= \frac{-1}{14} \\ f(1) &= \frac{3}{6} = \frac{1}{2} \\ f(3) &= \frac{5}{14} < \frac{1}{2}. \end{aligned}$$

On the interval $[-3, 3]$, the absolute maximum value of f is $\frac{1}{2}$ at $x = 1$ and the absolute minimum value of f is $\frac{-1}{14}$ at $x = -3$. □