Math 101 Quiz 7 Date 08/12/2012

Ex. Let $f(x) = e^{2x} + 2e^{-x}$.

a) Find the open intervals on which f is increasing and decreasing

b) Find any local or absolute extremum.

Solution: The domain of f is $\mathbb{R}$.

For every x in $\mathbb{R}$, we have: $f'(x) = 2e^{2x} - 2e^{-x} = 2(e^{3x}-1)e^{-x}$

So $f'(x) = 0$ iff $e^{3x} = 1$ iff $x = 0$. Thus f has only one critical point $x = 0$

x	$-\infty$		0		$+\infty$
$f'(x)$		$-$	0	$+$	
$f(x)$	$+\infty$	$\searrow$	3	$\nearrow$	$+\infty$

$\lim_{x \to +\infty} f(x) = +\infty$, $\lim_{x \to -\infty} f(x) = +\infty$.

So f has no absolute maximum.

a) f is increasing on $(0, +\infty)$

f is decreasing on $(-\infty, 0)$

b) 0 is the absolute minimum, and the absolute minimum value is $f(0) = 3$.