Math 1B (7:30am – 8:20am)
Group Quiz 9
Wed Nov 25, 2009

Group Members' Names:
[Use the name you asked to be called]

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SCORE: ___ / 10 POINTS

For these 3 questions, you may <u>NOT</u> use any hyperbolic identities, nor the derivatives or anti-derivatives of any hyperbolic functions, unless you prove them.

Rewrite $\cosh^2 x + \sinh^2 x$ in terms of exponential functions, simplify, then rewrite in terms of hyperbolic functions, if possible.

Prove a formula for $\cosh(x - y)$ in terms of hyperbolic functions.

Given that $\tanh x = \dfrac{\sinh x}{\cosh x}$, find $\lim\limits_{x \to \infty} \tanh x$ algebraically.

For all remaining questions, you may use the hyperbolic identity $\cosh^2 x - \sinh^2 x = 1$, and the derivatives and anti-derivatives of $\sinh x$ and $\cosh x$, without proving them. You must prove any other hyperbolic identity, derivative or anti-derivative you use.

Prove an identity involving $\operatorname{csch} x$ and $\coth x$, which resembles the Pythagorean identity involving $\csc x$ and $\cot x$.

Find $\dfrac{d}{dx}\dfrac{\sinh x}{1-\cosh x}$. Simplify your answer.

Find $\int e^{-2x}\cosh 3x\,dx$. Simplify your answer.

Find $\int \tanh(\ln x)dx$. Simplify your answer.

Find a formula for $\tanh^{-1} x$.

Find $\frac{d}{dx}\cosh^{-1} x$ by implicit differentiation on $y = \cosh^{-1} x$.

Find $\frac{d}{dx}\tanh^{-1}(\cos x)$. Simplify your answer.

For this question only, you may use the derivative of $\tanh^{-1} x$ that you found in the handout without proving it, if useful.

Find $\int \sinh^{-1} x \, dx$.