One-Page Review

§7.9 (Hyperbolic Trig), §8.1 (Integration by Parts)

MATH 1910 Recitation
October 18, 2016

(1) $\sinh(x) =$ ____ (1) $\cosh(x) =$ ____ (2) $\tanh(x) =$ ____ (3)

$\coth(x) =$ ____ (4) $\operatorname{sech}(x) =$ ____ (5) $\operatorname{csch}(x) =$ ____ (6)

(2) Derivatives of hyperbolic trigonometric functions

$\frac{d}{dx}\sinh(x) =$ ____ (7) $\frac{d}{dx}\cosh(x) =$ ____ (8)

$\frac{d}{dx}\tanh(x) =$ ____ (9) $\frac{d}{dx}\coth(x) =$ ____ (10)

$\frac{d}{dx}\operatorname{sech}(x) =$ ____ (11) $\frac{d}{dx}\operatorname{csch}(x) =$ ____ (12)

(3) Integrals of hyperbolic trigonometric functions

$\int \sinh(x)\,dx =$ ____ (13) $\int \cosh(x)\,dx =$ ____ (14)

$\int \operatorname{sech}^2(x)\,dx =$ ____ (15) $\int \operatorname{csch}^2(x)\,dx =$ ____ (16)

$\int \operatorname{sech}(x)\tanh(x)\,dx =$ ____ (17) $\int \operatorname{csch}(x)\coth(x)\,dx =$ ____ (18)

(4) Inverse Hyperbolic Functions

Function	Domain	Derivative
$\sinh^{-1}(x)$	(19)	(20)
$\cosh^{-1}(x)$	(21)	(22)
$\tanh^{-1}(x)$	(23)	(24)
$\coth^{-1}(x)$	(25)	(26)
$\operatorname{sech}^{-1}(x)$	(27)	(28)
$\operatorname{csch}^{-1}(x)$	(29)	(30)

(5) **Integration by parts**

$\int u\,dv =$ ____ (31)

PRACTICE PROBLEMS

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(1) Simplify $\sinh(\ln x)$ and $\tanh(\frac{1}{2}\ln(x))$.

(2) Find the derivative.

  (a) $y = \ln(\cosh(x))$.

  (b) $y = \operatorname{sech}(x)\coth(x)$.

(3) Calculate the integral.

  (a) $\int \cosh(2x)\,dx$

  (b) $\int \tanh(3t)\operatorname{sech}(3t)\,dt$

  (c) $\int \frac{\cosh(x)}{3\sinh(x)+4}$

  (d) $\int \frac{dx}{\sqrt{x^2-4}}$

  (e) $\int \frac{-1}{x\sqrt{x^2+16}}\,dx$

  (f) $\int xe^{-x}\,dx$

  (g) $\int x^3 e^{x^2}\,dx$.

  (h) $\int_1^3 \ln x\,dx$.

(4) Find the volume of the solid obtained by revolving $y = \cos x$ for $0 \le x \le \pi/2$ around the y-axis.