

King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
MATH 101-Quiz 4 **Term 091**
Instructor: Prof. Othman Echi

NAME:..... ID:..... Section: 08

Show your work ... Show your work ... Show your work ... Show your work

Exercise 1. Prove the following properties:

- (1) $\frac{d}{dx}(\sinh^{-1}(x)) = \frac{1}{\sqrt{1+x^2}}$.
- (2) $\frac{d}{dx}(\tanh^{-1}(x)) = \frac{1}{1-x^2}$.

Exercise 2. Show that for any real numbers x, n , we have:

$$(\cosh x + \sinh x)^n = \cosh(nx) + \sinh(nx).$$

Solutions

Exercise 1. See lectures.

Exercise 2.

It suffices to remark that

$$\cosh x + \sinh x = \frac{e^x + e^{-x}}{2} + \frac{e^x - e^{-x}}{2} = e^x.$$

this yields

$$(\cosh x + \sinh x)^n = e^{nx} = \cosh(nx) + \sinh(nx).$$