

(1)[4 points] Show that for any real number n

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

(2)[3 points] Find the derivative of

$$H(t) = \tanh(e^t)$$

(3)[4 points] Find

$$\lim_{x \rightarrow 0} \frac{e^x - 1 - x}{x^2}$$

(4)[4 points] Find

$$\lim_{x \rightarrow 1} \frac{1 - x + \ln x}{1 + \cos(\pi x)}$$