Hyperbolic Functions

The hyperbolic sine function, denoted sinhx and pronounced "cinch x", is defined as

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

The hyperbolic cosine function, denoted coshx and pronounced like it rhymes with "gosh", is defined as

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

The remaining 4 hyperbolic functions are defined in an analogous way with the trig functions:

Hyperbolic tangent $\tanh x = \dfrac{\sinh x}{\cosh x} = \dfrac{e^x - e^{-x}}{e^x + e^{-x}}$

Hyperbolic cotangent $\coth x = \dfrac{\cosh x}{\sinh x} = \dfrac{e^x + e^{-x}}{e^x - e^{-x}}$

Hyperbolic secant $\sec hx = \dfrac{1}{\cosh x} = \dfrac{2}{e^x + e^{-x}}$

Hyperbolic cosecant $\csc hx = \dfrac{1}{\sinh x} = \dfrac{2}{e^x - e^{-x}}$

1. Find the exact values of the following:
a) sinh 0   b) cosh 0   c) tanh 0   d) coth 0   e) sech 0   f)csch 0

2. Approximate each value to 4 decimal places:
a) sinh 2   b) tanh 2

3. Prove that $\cosh^2 x - \sinh^2 x = 1$