1. Find \( dy/dx \) if:
   
   (a) \( y = \sinh(x^3 - \log_e x) \)
   
   (b) \( y = \tanh(\cos x) \)

   **DO NOT SIMPLIFY YOUR ANSWERS TO QUESTION 1**

2. (a) Use the identity \( \cosh^2 X - \sinh^2 X = 1 \) to show that

   \[
   \tanh^2 X = \frac{\cosh^2 X - 1}{\cosh^2 X}.
   \]

   (b) By taking the square root of both sides of the result in part (a) show that, if \( X \geq 0 \), then

   \[
   \tanh X = \frac{\sqrt{\cosh^2 X - 1}}{\cosh X}.
   \]

   (c) By substituting \( X = \arccosh x \), into the result in part (b), find an algebraic expression for \( \tanh(\arccosh x) \) in terms of \( x \), for \( x \geq 1 \).

3. Show that \( \text{arcsinh} \ 2 = \log_e(2 + \sqrt{5}) \) (make sure you show all your working).

4. Find \( dy/dx \) if:
   
   (a) \( y = \arccos(x^3 + 2x) \)
   
   (b) \( y = (\text{arcsinh} \ x)^3 \)
   
   (c) \( y = (\text{arctanh} \ x)(\arccosh \ x) \)