

Write all answers in exact form. Draw boxes around your final answers.

1. If $\tanh x = \frac{2}{3}$, find $\sinh x$ and $\cosh x$.

Solution: We use the relation $1 - \tanh^2 x = \frac{1}{\cosh^2 x}$ to get

$$\begin{aligned} 1 - \left(\frac{2}{3}\right)^2 &= \frac{1}{\cosh^2 x} \\ \frac{5}{9} &= \frac{1}{\cosh^2 x} \\ \cosh^2 x &= \frac{9}{5} \end{aligned}$$

from which we get $\cosh x = \frac{3}{\sqrt{5}}$.

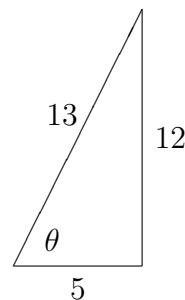
We then use the relation $\sinh x = \cosh x \tanh x$ to find that

$$\begin{aligned} \sinh x &= \frac{3}{\sqrt{5}} \cdot \frac{2}{3} \\ &= \frac{2}{\sqrt{5}}. \end{aligned}$$

2. Find $\cos\left(\tan^{-1}\left(\frac{12}{5}\right)\right)$.

Solution: We draw a right triangle containing the angle $\theta = \tan^{-1}(12/5)$, and read off the cosine of θ from the triangle. We get

$$\cos \theta = \frac{5}{13}.$$



3. If $y = \sin^{-1}(2x - 1)$, find y' .

Solution: We have

$$\begin{aligned} y' &= \frac{2}{\sqrt{1 - (2x - 1)^2}} \\ &= \frac{2}{\sqrt{4x - 4x^2}} \\ &= \frac{1}{\sqrt{x - x^2}}. \end{aligned}$$