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1. Find the explicit expression for the inverse of the hyperbolic function $y = \sinh x$, $x = \operatorname{arsinh} y$. (Use the definition for $y = \sinh x$ and solve for y.)

2. Determine (without calculator)

   a) $\arcsin 0$ b) $\arcsin 1$ c) $\arcsin \dfrac{1}{2}$

   d) $\arcsin \dfrac{\sqrt{3}}{2}$ e) $\arctan 1$ f) $\arctan \infty$

3.   a) Let $f(x) = x/\sqrt{1 - x^2}$. Determine the expression for combined functions $f(f(x))$ and $f(f(f(x)))$.

   b) Let $f(x) = ax + b$ and $g(x) = cx + d$. What conditioin must the constants a, b, c, d fulfill in order for $f(g(x)) = g(f(x))$ to hold true?

4. Find a point along the curve $y = x + 1/x$, where the tangent of the curve is horizontal.

5. Determine the first, second and third derivatives y', y'' and y''' of functions

   a) $y = (3 - x)^4$ b) $y = \dfrac{x - 1}{x + 1}$

   c) $y = \sin x^2$ d) $y = \dfrac{\sin x}{x}$.

6. Calculate all derivatives of the function

$$f(x) = \frac{1}{1 + x}, \qquad x > -1,$$

   at origin $x = 0$. Hint: use the geometric series.