Problem 1. Find an expression for $\frac{d}{dx}\left(f(x)^{g(x)}\right)$.

Problem 2. Use the preceding problem to compute the derivative of $x^{(x^x)}$.

Problem 3. Compute the derivative of $\operatorname{arccot} x$.

Problem 4. Compute the derivative of
$$f(x) = \frac{1}{2}\ln\left(\frac{x+1}{x-1}\right).$$
What are the domains of f and f'?

Problem 5. Find values for a and b so that the function
$$f(x) = \sin(ax + b)$$
passes through the point $(2, 1/2)$ with slope -1.

   Are there multiple choices of a and b that work? Do these choices actually give you different functions f?