1. Find the derivative of \( f(x) = \ln(x^2 + x + 1) \).

2. Suppose \( a \) is a positive number.
   (a) Find the derivative of \( x^a \).
   (b) Show that the derivative of \( a^x \) is \( a^x \ln(a) \). (Hint: Let \( y = a^x \).)
   (c) Discuss: Why is the derivative of \( a^x \) not \( xa^{x-1} \)?

3. We will find the derivative of \( \arctan(x) \).
   (a) Let \( \theta = \arctan(x) \). Solve for \( x \) in terms of \( \theta \).
   (b) Draw an acute triangle representing the relationship you found in part (a).
   (c) Find \( \frac{d\theta}{dx} \).
   (d) Find the derivative of \( \arctan(x) \). (Hint: Combine parts (b) and (c).)

4. Find \( \frac{dy}{dx} \) for each of the following curves.
   (a) \( y = 2^{3^x} \)
   (b) \( y = xe^x \)
   (c) \( x^3 + y^4 = 7 \)
   (d) \( y = \sin(3x + 4y) \)