Some Useful Facts About Exponentials and Logarithms:

- \( \frac{d}{dx} e^x = e^x \),
- \( \frac{d}{dx} a^x = a^x \ln a \),
- \( \frac{d}{dx} \ln x = \frac{1}{x} \),
- \( \frac{d}{dx} \log_a x = \frac{1}{x \ln a} \).

Individual Questions:

1. Assume a function \( f(x) = y \) is defined implicitly by \( \ln(2x + y) + xy = 1 + \ln 3 \). Find the equation for the normal line to the graph at the point \((1, 1)\).

2. Compute the following limits or show that they do not exist
   (a) \( \lim_{x \to 2} \frac{x^5 - 32 + \ln(x - 1)}{x^3 - 8} \),
   (b) \( \lim_{x \to \infty} \frac{2e^{2x} + x^{22}}{\sqrt{e^{2x} - 2 \cos(2x)}} \),
   (c) \( \lim_{x \to 0} \frac{x^2 \ln |x|}{\sin x} \).

3. Consider the function \( f(x) = e^{x^2 - 1} - 1 \) defined on the interval \([-2, 3]\).
   (a) Find all zeros, local maxima and minima, global maxima and minima, and inflection points of \( f \).
   Find the intervals on which \( f \) is positive/negative, and those on which \( f \) increases/decreases.
   (b) Sketch the graph of \( f \).