(1) (10 points) Solve the equation
\[ e^{ax} = ce^{bx} \]
for \( x \), where \( a, b \) and \( c \) are constants, \( c > 0 \) and \( a \neq b \).

(2) (20 points) Let \( f(x) = \ln(\ln x) \). (The domain of \( f(x) \) is whenever \( \ln(\ln x) \) is defined.)
   (a) (5 points) Find the inverse function \( f^{-1}(x) \) of \( f(x) \).
   (b) (10 points) What are the domains and ranges of \( f(x) \) and \( f^{-1}(x) \)?
   (c) (5 points) Where are \( f(x) \) and \( f^{-1}(x) \) continuous?

(3) (15 points) Find the tangent line of the curve \( y^2 = x^3 \) at the point \((1, 1)\). (Do not use the laws of derivative to find the slope. Compute it using its definition.)

(4) (10 points) Let
\[
f(x) = \begin{cases} 
  cx - 1 & \text{if } x \geq 1 \\
  1 - cx^2 & \text{if } x < 1 
\end{cases}
\]
where \( c \) is a constant. For what values of \( c \) is \( f(x) \) continuous on \(( -\infty, \infty )\)?

(5) (15 points) Find all the horizontal asymptotes of the curve
\[
y = \frac{\sqrt{4x^2 + 1}}{x + 1}.
\]

(6) (30 points) Find the following limits if they exist.
   (a) (10 points) \( \lim_{x \to 0} \frac{x^3 - 1}{x^2 - 1} \).
   (b) (10 points) \( \lim_{t \to 9} \frac{9 - t}{3 - \sqrt{t}} \).
   (c) (10 points) \( \lim_{x \to \infty} (\sqrt{x + 1} - \sqrt{x}) \).