3. [4 points] Let $h(x) = (x+3)e^{2x-2}$. Then the derivative of h is given by the formula $h'(x) = (2x+7)e^{2x-2}$. Find an equation for the tangent line to the graph of $y = h(x)$ at $x = 1$.

Answer: $y =$ _____

4. [10 points] Consider the function g defined by $g(x) = \begin{cases} \dfrac{1}{e^x - 1} & \text{if } x < \frac{1}{2} \\ \cos(x^x) & \text{if } \frac{1}{2} \le x < 5 \\ \dfrac{x^2}{(x-1)(6-x)} & \text{if } x \ge 5. \end{cases}$

a. [5 points] Use the limit definition of the derivative to write an explicit expression for $g'(3)$. *Your answer should not involve the letter g. Do not attempt to evaluate or simplify the limit.* Please write your final answer in the answer box provided below.

Answer: $g'(3) =$

b. [3 points] Find all vertical asymptotes of the graph of $g(x)$. If there are none, write NONE.

Answer: _____

c. [2 points] Determine $\lim_{x \to \infty} g(x)$. If the limit does not exist, write DNE.

Answer: _____