6. [5 points] Consider the differentiable function Z defined by

$$Z(v) = \begin{cases} \dfrac{e^{v-1} - v}{(v-1)^2} & \text{if } v \neq 1 \\ \frac{1}{2} & \text{if } v = 1. \end{cases}$$

Use the limit definition of the derivative to write an explicit expression for $Z'(1)$.
Your answer should not involve the letter Z. Do not attempt to evaluate or simplify the limit.
Please write your final answer in the answer box provided below.

Answer: $Z'(1) =$

7. [6 points] Consider the family of functions

$$g(x) = 16r^3 \ln(|x|) + \frac{1}{3}k^3x^3$$

where r and k are nonzero constants. Note that

$$g'(x) = \frac{1}{x}(k^3x^3 + 16r^3) \qquad \text{and} \qquad g''(x) = \frac{1}{x^2}(2k^3x^3 - 16r^3).$$

Find values of r and k so that $g(x)$ has an inflection point at $(1, 9)$. Be sure to justify that $(1, 9)$ is in fact an inflection point of $g(x)$ for your choice of r and k.

Answer: $r =$ _____ and $k =$ _____