

10. [8 points] Consider the family of functions  $g(x) = e^x - kx$ , where  $k$  is a positive constant.
- a. [2 points] Show that the point  $(\ln(k), k - k \ln(k))$  is the only critical point of  $g(x)$  for all positive  $k$ . Show all your work to receive full credit.
- b. [2 points] Show that  $g(x)$  has a global minimum on  $(-\infty, \infty)$  at  $x = \ln(k)$ . Use calculus to justify your answer.
- c. [4 points] Find all values of  $0.5 \leq k \leq 2$  that maximize the  $y$ -value of the global minimum of  $g(x)$  on  $(-\infty, \infty)$ . Use calculus to justify your answer. Write NONE if no such value exists.

**Answer:**  $k =$  \_\_\_\_\_