4. [12 points] Consider the family of functions

$$f(x) = ax - e^{bx},$$

where a and b are positive constants.

a. [4 points] Any function $f(x)$ in this family has only one critical point. In terms of a and b, what are the x- and y-coordinates of that critical point?

b. [4 points] Is the critical point a local maximum or a local minimum? Justify your answer with either the first-derivative test or the second-derivative test.

c. [4 points] For which values of a and b will $f(x)$ have a critical point at $(1, 0)$?