- **2.** [10 points] Consider the family of functions  $f(x) = x^2 e^{ax}$  where a > 0. Show all your work in each part below.
  - **a**. [2 points] Find the unique value of a such that f(2) = 12.

Answer: a =\_\_\_\_\_

*Note:* in the parts below, remember that a is a parameter, not the value you just found in part **a**. **b**. [2 points] Find the derivative f'(x) in terms of the parameter a.

**Answer:** f'(x) = \_\_\_\_\_

c. [2 points] Find all critical points of f(x) in terms of the parameter a.

Answer:  $x = \_$ 

**d**. [4 points] Find all local extrema of f(x) in terms of a. If there are none of a particular type, write NONE. Use calculus to find your answers, and show enough evidence to justify them.

**Answer:** Local min(s) at x =\_\_\_\_\_ and Local max(es) at x =\_\_\_\_\_

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