Name _____

Homework 25
section 4.3

1. (6) Consider the function $f(x) = bxe^{-ax}$, with $a > 0$ and $b \neq 0$. What is the critical point? Use the first derivative test to determine under what conditions on b the critical point will be a local minimum?

2. (6) Find and classify the critical point of $g(t) = \dfrac{1}{\alpha + (t-\beta)^2}$, given that $\alpha > 0$.

3. (8) Given $f(x) = x^3 - ax^2 + 3x + b$,

   (a) Determine conditions on a and b so that $f(x)$ has exactly one critical point.

   (b) Could $f(x)$ have no critical points? If yes, determine the necessary conditions on a and b. If no, explain why not.

   (c) Determine conditions on a and b so that $f(x)$ has an inflection point.

Use the space below to show your work.