Math 233 Warm Up Problems  
September 28, 2009

1. Find the maximum and minimum of the function \( f(x) = x^3 - 3x^2 + 1 \) on the interval \([1, 3]\).
   More importantly, what are the steps you followed to obtain your solution?

2. Find all local maximums and minimum of the function \( f(x) = x^3 - 3x^2 + 1 \).
   More importantly, what are the steps you followed to obtain your solution?

3. Find all points such that \( \nabla f = \vec{0} \).
   (a) \( f(x, y) = x^2 + 4y^2 - 4x \)
   (b) \( f(x, y) = x^3 + y^3 - 6xy \)
   (c) \( f(x, y) = xy + 2/x + 4/y \)
   (d) \( f(x, y) = (x - y)(xy - 1) \)
   (e) \( f(x, y) = x^2y - 6y^2 - 4x^2 \)

Lecture Problems

4. Find all critical points in Problem 3.