Math 255
Homework Set 6
Winter 2008
Due at the beginning of class, Friday, Feb. 22

Note: please staple pages together.

The assignment consists of the following problems from the text. These are *all* odd-numbered problems! This means that (i) the answers to most if not all of them are in the back of the book and (ii) your write-up had better include much more detail than just the answers.

- Section 15.3, Pages 955–958: #33, #43, #61, #77, #83, and #87.
- Section 15.4, Pages 966–967: #3, #5, #13, #17, and #37.
- Section 15.5, Pages 974–976: #3, #7, #21, and #51.

The following problems are also part of the assignment:

A. Give a rigorous proof (using the ϵ and δ definition of a limit) that the function

$$f(u,v,w) := \begin{cases} \dfrac{w^3 - 9w^2 + 27w - 27}{u^2 - 2u + v^2 - 4v + w^2 - 6w + 14}\,, & (u,v,w) \neq (1,2,3)\,, \\ 0\,, & (u,v,w) = (1,2,3) \end{cases}$$

is continuous at $(u,v,w) = (1,2,3)$. Hint: begin by changing variables by $u = 1 + x$, $v = 2 + y$, $w = 3 + z$ to localize around the point of interest, and introduce spherical coordinates in place of (x,y,z).

B. Use the *definition* to show that $f(u,v) := u^2v^3$ is differentiable at the point $(u,v) = (1,-1)$.