Information regarding Exam II  
Honors Calculus III, Fall 2004

Exam II will be on Friday, October 29, 2004 in our regular classroom.  
As usual, graphing calculators or programmable calculators that can store formula can not to be used during the exam. You may bring a small scientific calculator that can perform basic operations such as square roots and trig functions.
Cell phones should be turned off before the exam.  
Blank paper will be provided so all you need is something to write with.
The exam will be based on the classroom discussions and the homework assignments.
Your are expected to know the following topics (and the corresponding formulas):

1. **11.3:**
   a) Partial derivatives.
   b) Implicit differentiation. Typical problems in implicit differentiation are those like HW problems 24 and 26.

2. **11.4:**
   a) Total differential.
   b) Incremental approximation.
   c) Tangent plane to a surface given in the form \( z = f(x,y) \).

3. **11.5:** Chain rule for two or more parameters. For example, find \( \frac{\partial f}{\partial \theta} \) and \( \frac{\partial f}{\partial \nu} \), where \( f = f(x,y,z) \) and \( x = x(r,\theta,\nu), \ y = y(r,\theta,\nu) \) and \( z = z(r,\theta,\nu) \). You need to use the chain rule in this type of problems. No credit will be given for just substituting \( r, \theta, \nu \) and taking derivatives. Typical problems are 8.b), 10.b), 20 and Example 8.

4. **11.6:**
   a) Find the directional derivative in the direction of a given vector. Remember, if the given vector is not unit you need to make it a unit one!.  
   b) Gradient. Remember, the gradient is a vector and it is the direction in which the function increases most rapidly from a given point \( P \). Its magnitude is the greatest rate of increase at that point.
   c) Also, the gradient is normal to the surface \( F(x,y,z) = C \). You need to know how to write the equation of the tangent plane to such a surface at a given point.
Here are a couple of questions for you to think about:
(i) What is the difference between the method to find the tangent plane in this situation, that is when you are given the surface \( F(x, y, z) = C \), and the method in 2. c), that is when \( z = f(x, y) \)?

(ii) Which of the two methods can be used on both cases and how can it be done?

5. **11.7:** Finding relative extrema. Remember, you need to find the critical points using the partial derivatives, then compute \( D \) and classify such points.

6. **11.8:** Will not be covered on this test as we haven’t collected homework on this section yet.