<div align="center">**Quiz 2**   **Calculus 3**   **Due 9/2/2009**</div>

This is an open-book, open-note, open-*Mathematica* take-home quiz. Each problem is worth 2 points. You are encouraged to work in groups of 2-4 and submit a single writeup for each group. You should include clear and complete, but not excessive, explanation of your conclusions.

1. Consider the collection of points satisfying the equation $4x^2 + 25y^2 + z^2 = 100$. One extremely useful way to gain an understanding of this surface (or for that matter many others) is by considering its *traces*. A *trace* is the two-dimensional curve produced by substituting some selected constant value in for one of the variables in an equation. Graphically, this amounts to considering the cross-section produced by slicing the three-dimensional surface with a plane.

    a) What shape is the trace of the plane $z = 0$ for the surface above?

    b) What shape is the trace of the plane $y = 0$ for the surface above?

    c) What shape is the trace of the plane $x = 0$ for the surface above?

    d) What are the traces of the planes $z = 10$ and $z = -10$ for the surface above? Why?

2. Read Examples 1 and 2 in section 12.6. What would you predict to be the equation for a cylinder of radius 1 centered on the *y*-axis?

3. Look at Examples 4 and 5 in §12.6.
    a) Think about the horizontal and vertical traces of these fascinating surfaces.

    b) Say "Ooooh!" or "Aaaah!" and place a check mark in the box at right: ☐

4. Consider the quadric surface with equation $\dfrac{x^2}{9} - \dfrac{y^2}{4} - \dfrac{z^2}{4} = 1$. Describe the horizontal and vertical traces of this surface carefully. If the traces are different for some values, make that clear.

5. Do #38 in the Chapter 12 Review.