Math 2415

Friday Problem Session on 12.6 (Models Project I), 13.1-13.3, 14.1

Your TA will set aside 45 minutes for your group to do the Active Learning Models Project #2: Saddle Surfaces. Although the questions in the models project may look different from problems on the homework and exams, they are actually very closely related. The project is designed to increase your understanding and enable you to more readily solve homework and exam problems.

For the rest of the session work through the following problems.

1. 13.2.11
2. 13.2.25
3. 13.3.3
4. 13.1.43. What does this curve look like? **Hint: You can find it on the red model in the models box.** You can also make this curve by drawing on a curve on a flat piece of paper and wrapping the paper into a cylinder.
5. (a) Parametrize the two curves that are given by the intersection of the cylinders $x^2 + y^2 = 25$ and $y^2 + z^2 = 25$. Explain why these curves each lie in a plane. What shape are they? **Hint: Two copies of the blue models in the box will help you visualize this curve.**
   (b) Parametrize the tangent line to this curve at the point $(3, 4, 3)$.
6. Let $z = f(x, y) = \frac{\log x}{y}$. Sketch the contours of $f(x, y) = k$ for $k = -1$, $k = 0$, and $k = 1$. **Hint:** Solve $\frac{\log x}{y} = k$ for x in terms of y and k.
7. 14.1.61
8. 14.1.62
9. 13.3.6
10. (From Fall 2010, Exam 1) Find the traces (i.e., slices) of the surface

$$x^2 = 1 + \frac{y^2}{4} + \frac{z^2}{9}$$

    in the planes $y = 0$, $z = 0$, and $x = k$, for $k = 0, \pm 1, \pm 2, \pm 3$. Then sketch the surface and name it.
11. (From Fall 2009, Exam 1)
    (a) Find a vector parametric equation for the line through the point $(1, 2, -1)$ that is normal to the plane $2x - y + 3z = 12$.
    (b) Find a parametrization of the plane containing the point $(1, -2, 1)$, $(2, -1, 0)$ and $(3, -2, 2)$.