Advanced Calculus - HW 2

This homework assignment is due this Friday, February 9. You should type it up in LaTeX, print the result and slide it under my office door.

The problem: Consider the graph of the function $f(x, y) = \cos(x^2 + y^2)$, where (x, y) lies in the disk $0 \leq x^2 + y^2 \leq \sqrt{\pi/2}$. We wish to find the surface area of this object.

1. Find a parametrization $\mathbf{T}(r, \theta)$ of this object.

2. Use a parametric function plotter to plot the object and include the image in this paper.

3. Compute and simplify the vector $\|\mathbf{T}_r \times \mathbf{T}_\theta\|$.

4. Write down the definite integral that you need to evaluate to find the area.

5. Evaluate the integral from part (d). You may use a numerical integrator, if necessary.

   A couple comments: You can include an image in LaTeX using the `includegraphics` command. To include an image named `pic.png` that lives in the same directory as your current document, you could type:

   `\includegraphics{pic.png}`

   To include code like the command above or any code that you used to generate an image, use the `verbatim` environment.