QUIZ 5 - MATH 251 Friday, October 5

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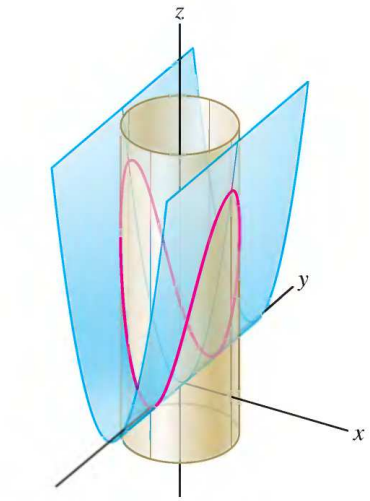
Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. (a) Describe $\dfrac{x^2}{yz} = 1$ by an equation of the form $z = f(r, \theta)$ in cylindrical coordinates.

   (b) Describe $z^2 = 3(x^2 + y^2)$ by an equation in spherical coordinates.

2. Use as elegant a parametrization as you can to parameterize the intersection curve of the surfaces $x^2 + y^2 = 1$ and $z = 4x^2$.



3. Let $\boldsymbol{r}_1(t) = \langle t^2, 1, 2t \rangle$ and $\boldsymbol{r}_2(t) = \langle 1, 2, e^t \rangle$. Follow the instructions closely:

(a) Compute $\boldsymbol{r}(t) = \boldsymbol{r}_1(t) \times \boldsymbol{r}_2(t)$.

(b) Use the answer in Part (a) to compute $\boldsymbol{r}'(t)$.

(c) Compute $(\boldsymbol{r}_1(t) \times \boldsymbol{r}_2(t))'$ using the product rule.

(d) Find a tangent vector to $\boldsymbol{r}(t)$ at $t = 1$.

(e) Find an equation (in vector or parametric form) for the tangent line to $\boldsymbol{r}(t)$ at $t = 1$.