MTH 255
Parametric Surfaces Homework

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1. Identify the surface whose vector equation is $\mathbf{r}(u,v) = (u+v)\mathbf{i} + (3-v)\mathbf{j} + (1+4u+5v)\mathbf{k}$.
2. Use GeoGebra to graph the parametric surface whose equation is $\mathbf{r}(u,v) = \langle u^2+1, v^3+1, u+v \rangle$ with $-1 \leq u, v \leq 1$.
3. Use GeoGebra to graph the parametric surface whose equation is $\mathbf{r}(u,v) = \langle u\cos v, u\sin v, u^5 \rangle$ with $-1 \leq u \leq 1$ and $0 \leq v \leq 2\pi$.
4. Use GeoGebra to graph the parametric surface whose equations are given by
$$\begin{aligned} x &= \sin v \\ y &= \cos u \sin 4v \\ z &= \sin 2u \ \sin 4v \end{aligned}$$
where $u \in [0, 2\pi]$ and $v \in \left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$.
5. Find a parametric representation of the part of the hyperboloid $x^2+y^2-z^2=1$ that lies to the right of the xz-plane.
6. Find a parametric representation for the part of the sphere $x^2+y^2+z^2=4$ that lies above the cone $z=\sqrt{x^2+y^2}$.
7. Find parametric equations for the surface obtained by rotating the curve whose equation is $y=e^{-x}$ with $x \in [0,3]$ about the x-axis. Use GeoGebra to graph this surface.