GEORGIA SOUTHERN UNIVERSITY

MATLAB Marina: Plotting 3D

Exercises

1. Write a MATLAB program that will plot the curve traced by the functions: $x(\theta) = 6\cos(\theta)$, $y(\theta) = -6\sqrt{2}\sin(\theta)$, and $z(\theta) = -6\sin(\theta)$ for the angle range $0 \le \theta \le 2\pi$ radians. This is a linear 3D parametric plot. The plot should have an appropriate title and axis labels.

2. Write a MATLAB program that will generate a surface plot of $f(x,y) = \frac{4x^2}{16} - \frac{3y^2}{16}$ for the range $-2.0 \le x \le 2.0$ and $-3.0 \le y \le 3.0$. The plot should have an appropriate title and axis labels.

3. Write a MATLAB program that will generate a surface plot of the mass of a conic surface. The conic surface is defined by $z = 2\sqrt{x^2 + y^2}$ for $0.5 \le z \le 4$ and the mass is related to z by $m = 6 - z$. The plot should have an appropriate title and axis labels.

   This problem is best solved using cylindrical polar coordinates (r, θ, z) rather than rectangular coordinates (x, y, z) for the underlying grid. Use z and θ for creating the initial grid, a grid for r can then be computed from the z and θ grids, grids for x and y can be computed from the r and θ grids, and m can be computed from z grid. Plot m versus and x and y for the surface plot.

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