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Selected Problem Set 5

1. Write an algorithm that rotates a polyline around the z axis by increments of $\delta\theta$ to create a polygonal mesh object, and storages it in a data structure identical to that found in the class notes. Make sure that no points appear more than once in the data structure.

2. Why do we wish to compute surface normals at vertices of polygonal mesh objects?

3. From the 2D parametric equation of a circle of unit radius and centered at $(A, 0)$, find the parametric equation of the torus formed by rotating this circle around the y axis.

4. Compute the normal vector to the 3D triangles specified by the following points: $P_1=(1,1,1)$, $P_2=(4,2,2)$, and $P_3=(2,4,3)$

5. Given $F(x, y, z)=x^2+y^2+z^2-1=0$, the implicit equation of the unit sphere, and its equivalent in parametric form $P(\theta, \phi)=(\cos\theta\sin\phi, \sin\theta\sin\phi, \cos\phi)$, show that $F(P(\theta, \phi))=0$.