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Geometric Modeling
Assignment sheet 8 (due July 2nd 2008)

Create a new experiment with GLGeometryViewer3D as main viewer.

(1) Surface of Revolution [1+5+4 points]

    a. Add a button that creates a control polygon in the x,y-plane, where the user can specify the number of these points. These control points describe the "generatrix" for a surface of revolution. Allow dragging them and display the G1 continuous cubic B-Spline. Hint: Resetting the camera allows you to edit the curve in the x,y-plane.

    b. Add a button to rotate the curve around the y-axis and by this forming a surface of revolution. Display this curve by create quadratic rational Bezier curves that show the rotation of the generatrix control points around the axis (360°). You will need either three or four segments to describe a full revolution (implement just one variant). Add copies of the "generatrix" at the angles you terminate the rotation segments.

    c. Now triangulate the surface: Instead of just showing circles of revolution, create a triangle mesh that approximates the surface. Let the user specify the number of subdivisions in each patch.

(2) Tensor Product Surfaces [1+5+4 points]

    a. Add a button that creates the points for a 3x3 grid of connected cubic Bezier patches (see slide 23 of Lecture #11; you will need 10x10 control points). Allow dragging the points and display the grid of curves starting and ending at the control points.

    b. Create a triangle grid with $n \times n$ vertices to visualize the surface that is defined by the Bezier patches.

    c. Add a button that guarantees C1 continuity while moving the points as little as possible.