User Guide

To view the applet you should have installed JAVA 7 32-bit (`jre-7u79-windows-i586.exe`, `www.java32bit.com`). In case Firefox is your browser it should be 32-bit. Moreover, you should set Security Level− >Medium in Java Control Panel.
The necessary graphics libraries download automatically after starting the applet. Please, wait a while!

The applet works in two modes: *Demonstration* → {*Bézier Curve* or *Letter Drawing*}:

- *Bézier Curve*: visualizes 3D Bézier curves.

- *Letter Drawing*: creates letters using cubic Bézier curves.

After returning to previous mode the last changes are restored so that we do not lose any information.

1   Visualization of 3D Bézier Curves

In *Bezier curve* mode the applet provides the following features:

- *Add control points*: left mouse button

- *Edit control points*:

    - *Translate a point*: left mouse button (press, hold and drag)
    - *Rotate the polygon*: left/right mouse button (press, hold and move but not on the control point)
    - *3D polygon*: rotate the current polygon and then move/generate a control point

- Bézier curve can be visualized in two modes: *Algorithm* → {*de Casteljau* or *Bernstein*}

    - *de Casteljau* mode
        * *Show Lines*: show the intermediate points $\mathbf{b}_i^r(t)$ and the intermediate control polygons
        * *Subdivision*: subdivide the curve and show in different colors the control polygons of the two curves obtained after the subdivision
    - *Bernstein* mode: visualize the Bézier curve using Bernstein polynomial representation

    Both algorithms (*de Casteljau* and *Bernstein*) have the following options:

- *Close Curve*: close the current curve so that the resulting curve is smooth

- *Random Points*: generate random initial control polygon

- *Show Bezier Curve*: show/hide the curve

- *Delete a random control point*: right mouse button (click on the point)

- *Reset All*: clear the screen

2 Creating Letters using Cubic Bézier Curves

Letter Drawing mode has the following main features:

- The last control point of a cubic Bézier polygon is an initial control point of the next polygon.

- *New Sequence*: begin a new sequence of polygons in case a single sequence of polygons is insufficient for representing some letters, e. g. O, A.

- *New Letter*: clear the screen

- *Delete random point*: right mouse button. In case the point is not the last for the current polygon, the whole polygon will be removed. Then the next polygon from the sequence automatically moves to its place.

3   Images from the applet's performance
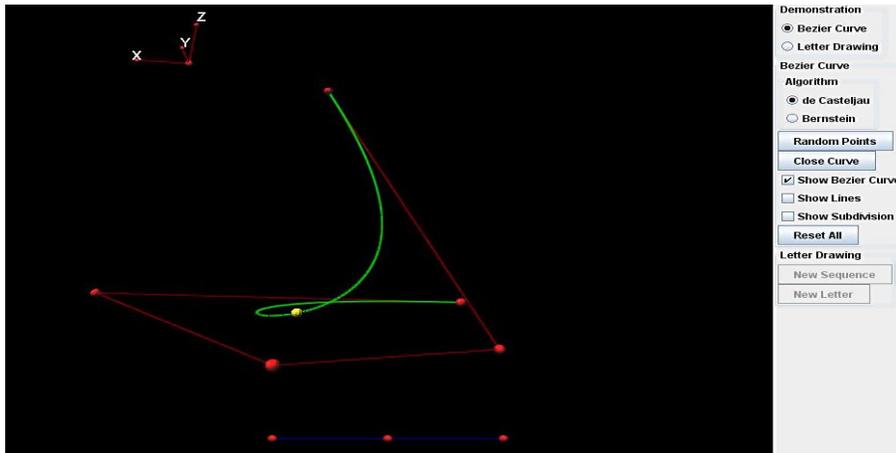
Figure 1: 3D Bézier curve
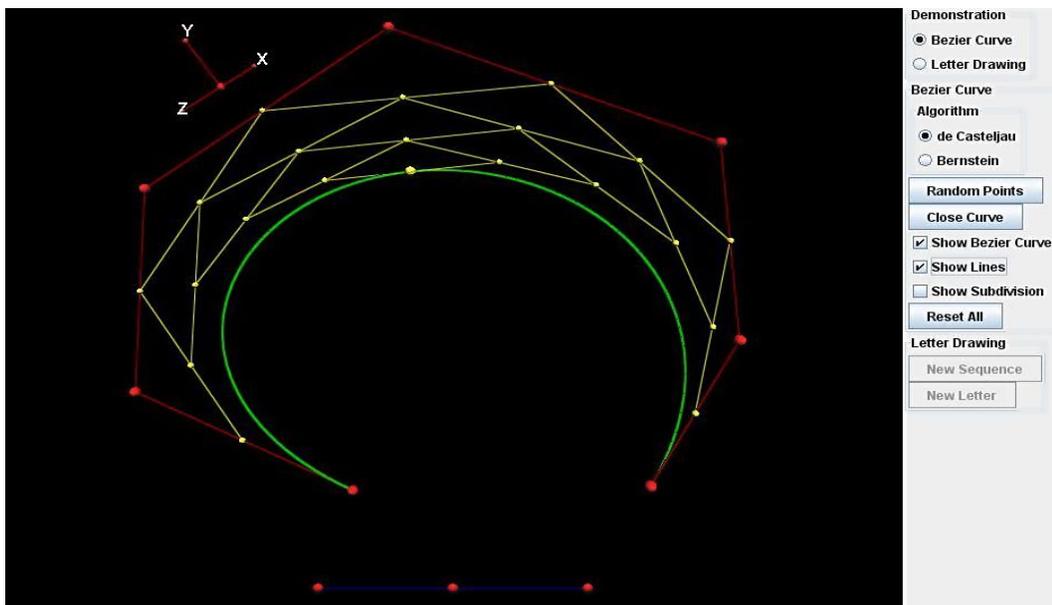
Figure 2: Bézier curve and the intermediate points with de Casteljau algorithm
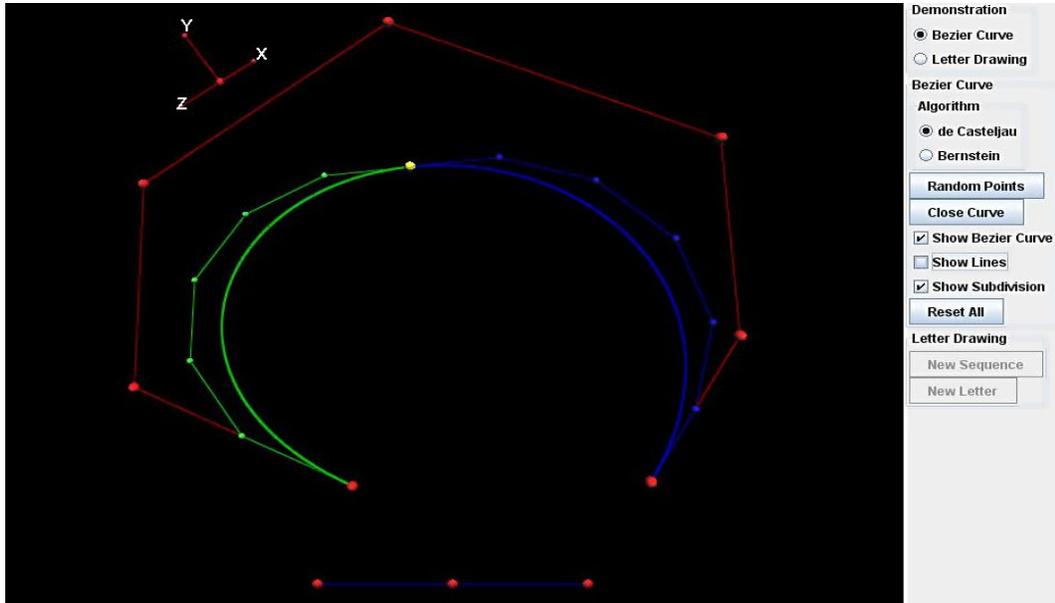
Figure 3: Subdivision of a Bézier curve
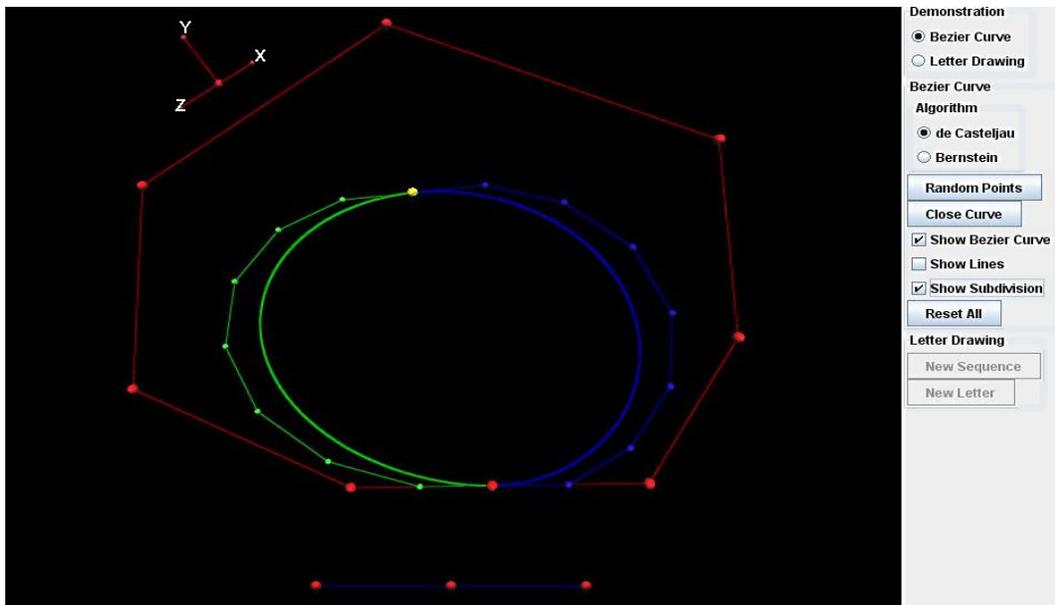
Figure 4: Closed Bézier curve and subdivision
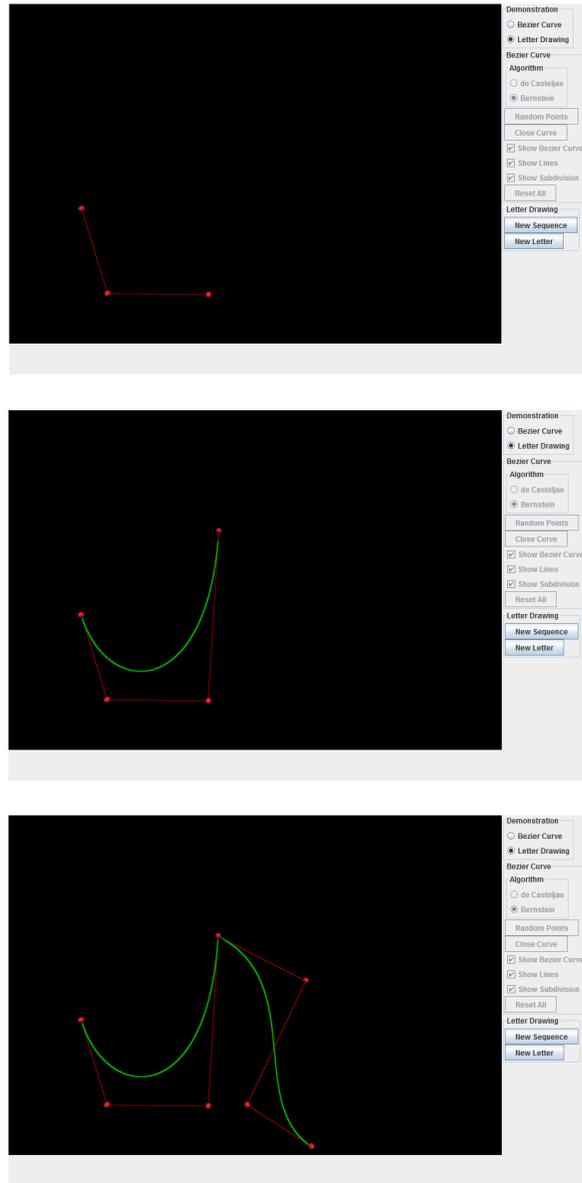
Figure 5: Consequent steps in creating letters
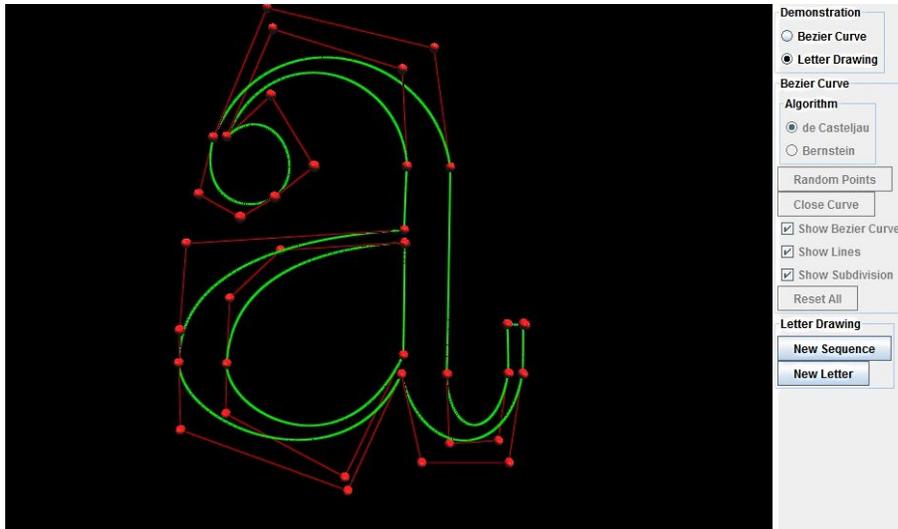
Figure 6: Representation of letter **a** using cubic Bézier curves
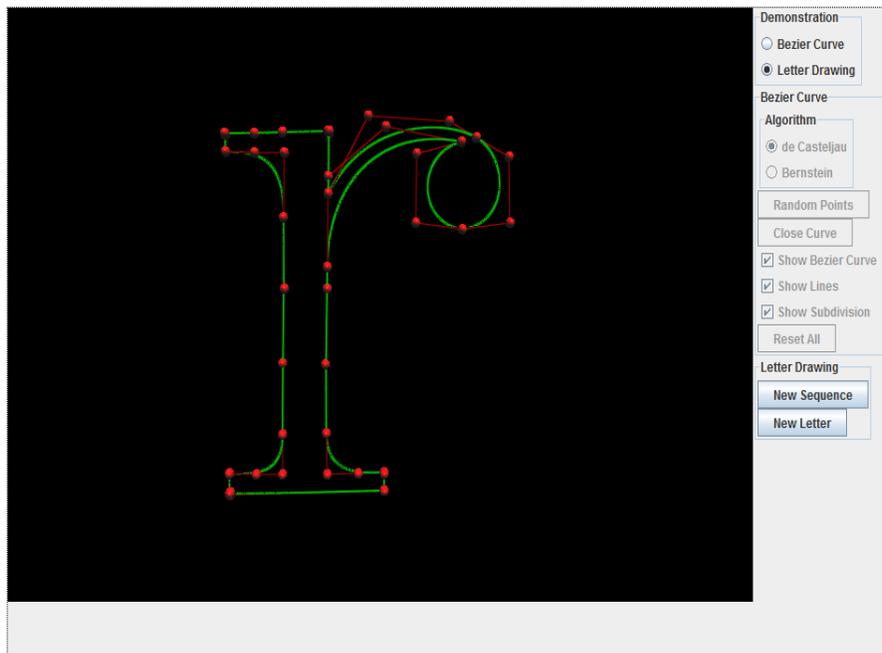
Figure 7: Representation of letter **r** using cubic Bézier curves
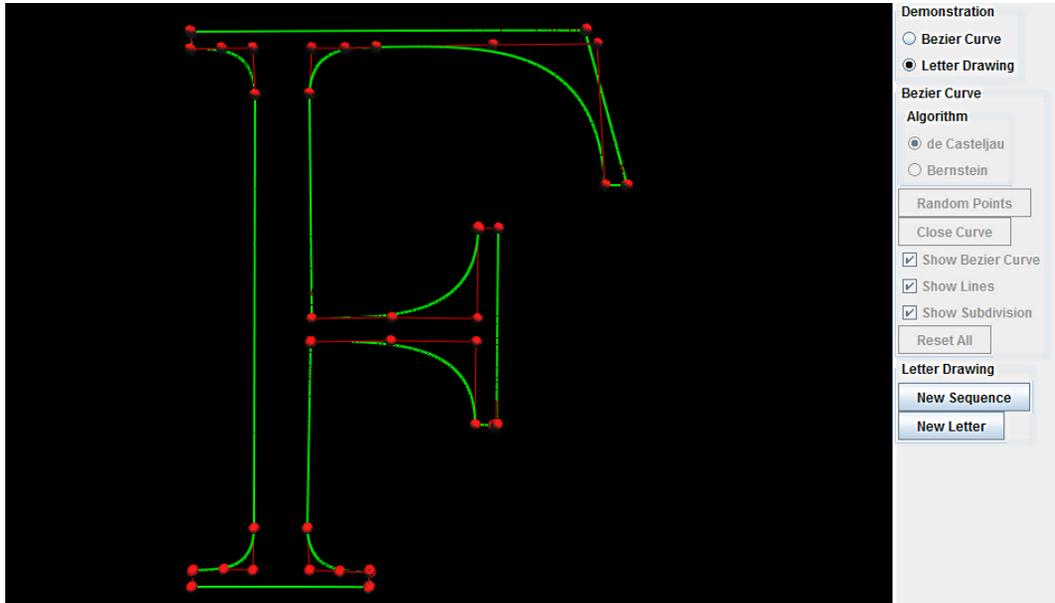
Figure 8: Representation of letter **F** using cubic Bézier curves
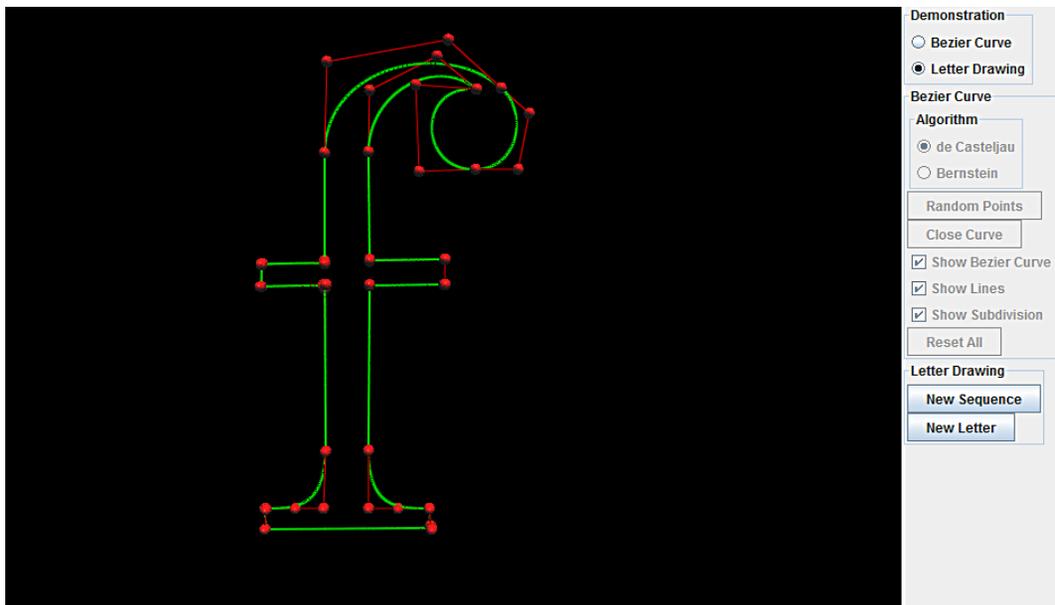
Figure 9: Representation of letter **f** using cubic Bézier curves
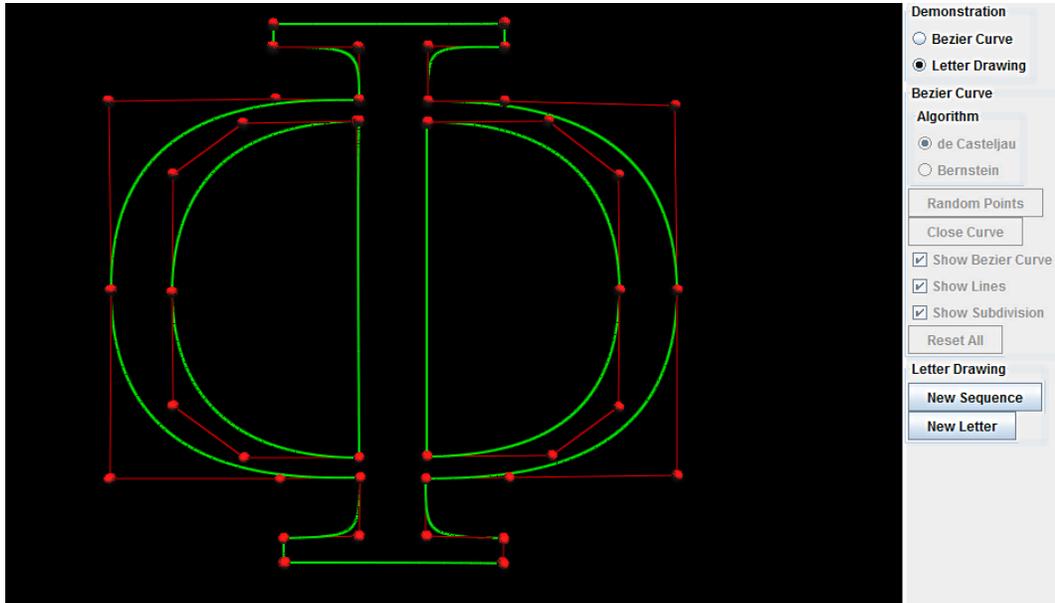
Figure 10: Representation of *cyrillic* letter **F** using cubic Bézier curves
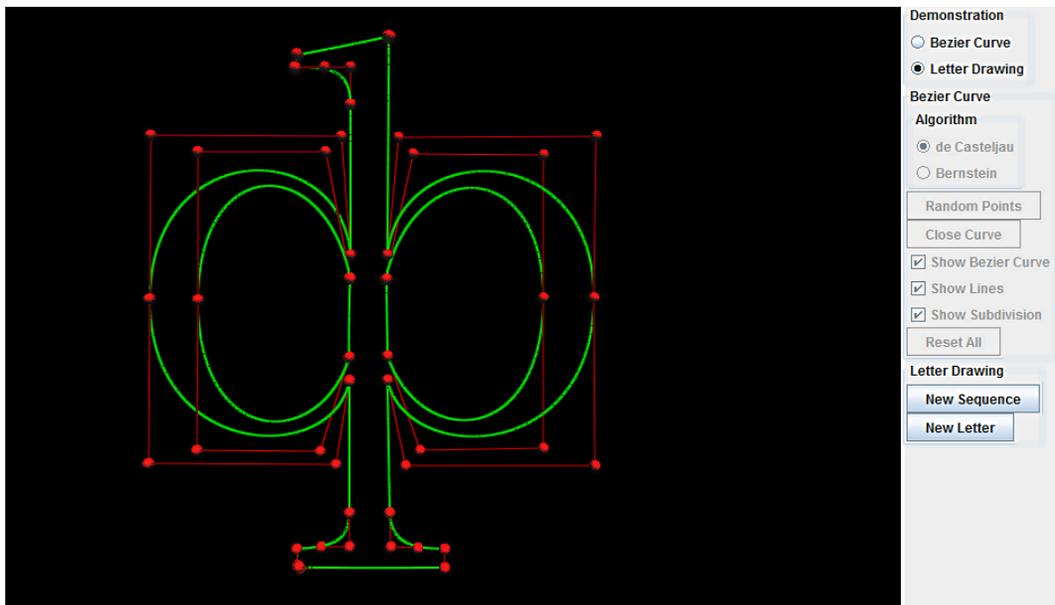
Figure 11: Representation of *cyrillic* letter **f** using cubic Bézier curves