

Advanced Computer Graphics Assignment

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Execution Instructions

To execute the set of Python scripts, make sure they are all placed in the same directory (as Questions 2 and 4 re-use the code from Questions 1 and 3, respectively). The scripts were written and tested with Python 3.7.1, but any version should work. The scripts also require that the `geomdl`, `numpy`, and `matplotlib` libraries be available.

The scripts for Questions 1 and 4 display the requested output, then launch into an interactive script that allows you to customize the displayed output. Questions 2 and 3 simply display the output and then exit. Most scripts also output some text regarding the output and/or how to interact with the script.

Question 2b

In order to support proper shape editing of the heart-shaped object through the decomposed Bezier curves, as performed for Question 2a, the continuity between the Bezier curve segments must be maintained. This ensures that the produced curve/object visually looks good, and that there are no cracks, sudden extreme angles, or gaps (that are not intended). The property is applied by maintaining C^n continuity, for some n . This means that the direction and magnitude of the derivative of the curve equations at the point where they join are equal through the n^{th} derivative.

As C^n continuity is computationally expensive to maintain, instead G^1 continuity is maintained in practice. This is applied by ensuring that the directions of the two segments' tangent vectors are equal at the point that they join up (differing from C^1 continuity by not placing a requirement on the magnitude of the tangent vectors). This is done as it achieves acceptable continuity, while being much less expensive to compute and maintain.