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Assignment in Computer Graphics II – Assignment 2 – Computer Graphics and Multimedia Systems Group

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Assignment 1 [2 Points] Barycentric coordinates

Given is a triangle with the edges A = (3, 0, 0), B = (0, 3, 0) and C = (0, 0, 3).



Calculate for both rays the intersection with the triangular plane using barycentric coordinates.

- What are the parameters of the coefficients α and the barycentric coordinates (*s*₁, *s*₂) of the intersections?
- Are the intersections within the triangle (A, B, C)? (Reason necessary)

Assignment 2 [1 Point] Interpolation with squared polynomials

Given polynomials:

$$f_0(u) = 2u^2 - 3u + 1$$
, $f_{\frac{1}{2}}(u) = -4u^2 + 4u$, $f_1(u) = 2u^2 - u$

and the definiton of a curve:

$$\mathbf{P}(u) = f_0(u)\mathbf{P}_0 + f_{\frac{1}{2}}(u)\mathbf{P}_{\frac{1}{2}} + f_1(u)\mathbf{P}_1$$

Show that P(u) has following interpolation properties:

$$\mathbf{P}(0) = \mathbf{P}_0, \quad \mathbf{P}(\frac{1}{2}) = \mathbf{P}_{\frac{1}{2}}, \quad \mathbf{P}(1) = \mathbf{P}_1$$

Assignment 3 [2 Points] Example de Casteljau-Algorithm

Evaluate the cubic Bézier-curve with control points

$$\mathbf{C}_{0} = \begin{pmatrix} 1.8 \\ 7.2 \end{pmatrix}$$
, $\mathbf{C}_{1} = \begin{pmatrix} 6.8 \\ 11.2 \end{pmatrix}$, $\mathbf{C}_{2} = \begin{pmatrix} 11.8 \\ 5.2 \end{pmatrix}$, $\mathbf{C}_{3} = \begin{pmatrix} 4.3 \\ 1.7 \end{pmatrix}$

graphically and mathematically with the de Casteljau-Algorithm for u = 0.4! Denote all the points!



Total points after sheet 2: 11 of 70.

Hand in: Until 26.04.2017 10:00 o'clock in mailbox of our chair (next to room H-A 7115).