



Übung zu Computergraphik II – Assignment 10 –

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Assignment 1 [1 Point] Arc length

Given the curve
$$\mathbf{C}(u) = \begin{pmatrix} u \\ \sqrt{1-u^2} \end{pmatrix}$$
 in R^2 for $u \in [0,1]$.

- 1. Sketch the shape of the curve.
- 2. Calculate the arc length function $l_C(u)$ with the help of $\mathbf{C}'(u)$. Use the equation

$$\frac{d}{dx}\arcsin(x) = \frac{1}{\sqrt{1 - x^2}}.$$
(1)

3. Curve **C** should be traversed with constant velocity in the time interval $t \in [0, 1]$. Give the function s(t), which describes the traveled distance for time interval $t \in [0, 1]$. Calculate **C**(t) with the function s(t).

Assignment 2 [1 Point] Camera coordinate system and up-vector

A camera moves on the spiral path $\mathbf{C}(t) = \begin{pmatrix} \cos(\omega t) \\ vt \\ \sin(\omega t) \end{pmatrix}$, where *v* is the vertical speed and ω is the angular

velocity (radians per second). The camera axis should always be aligned along the tangent direction.

- 1. Calculate the up vector. Assume that the up-vector remains the same for positive and negative direction of rotation.
- 2. How does the sign of its y component behaves?
- 3. Which value does the up vector take for v = 0?

Submission: 18.12.2014, before/at the beginning of the exercise.