CZ2003 Tutorial 3 (2016/17, Semester 2)

Curves

1. Write an explicit formula $y=f(x)$ for the straight line passing through the points with coordinates (1,2), (3,4).

2. Write an implicit formula $y=f(x)$ for the straight line intersecting the coordinate axes X and Y at the points with coordinates (1, 0) and (0, -*2*), respectively.

3. (a) Prove mathematically that the following parametric functions

$$x = \frac{1-t^2}{1+t^2} \qquad y = \frac{2t}{1+t^2} \qquad 0 \le t \le 1$$

define the unit circular arc in the first Cartesian coordinate quadrant.

(b) Compare this representation with the explicit $y = \sqrt{r^2 - x^2}$ and parametric $x = r\cos(\alpha)$ $y = r\sin(\alpha)$ representations in terms of quality of drawing when the curve has to be interpolated by straight line segments.

4. Propose parametric representations $x(u)$, $y(u)$, $u \in [0,1]$ of the 2D spiral and $x(u)$, $y(u)$, $z(u)$, $u \in [0,1]$ of the 3D helical curves as displayed in Figure Q4.

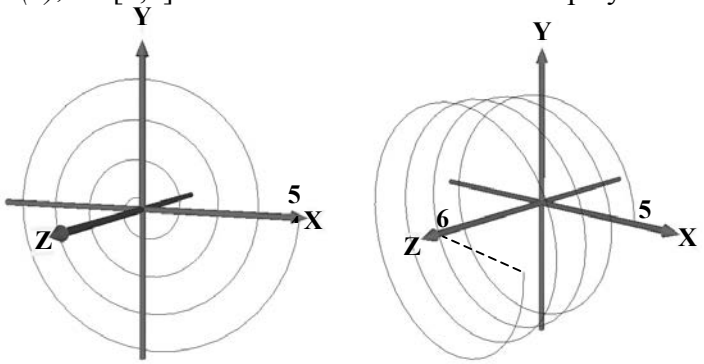

Figure Q4