# Programming #1 (4190.562)

## Due: March 28, 2018

A cubic Bézier curve $C(t) = \sum_{l=0}^{3} \mathbf{b}_l B_l^3(t) = \sum_{l=0}^{3} (x_l, y_l) B_l^3(t) = (x(t), y(t))$, $0 \le t \le 1$, can be used to define a different planar curve $D(t)$ as follows:

$$D(t) = C(t) + \alpha(\sin n\pi t)\ C'(t)^{\perp}, \quad 0 \le t \le 1,$$

where $\alpha$ is a scale factor, and $n$ is a natural number. When we edit the curve $C(t)$, the other curve $D(t)$ also changes its shape. Compute the self-intersection points of $D(t)$, $0 \le t \le 1$.