

Computer Aided Geometric Design  
Homework #4  
Due Tuesday, 15 September 2009

1. Find the distance from the point  $(1, 2)$  to the line  $3x + 4y - 1 = 0$ .
2. Given a rational cubic Bézier curve  $\mathbf{P}_{[0,1]}(t)$  whose control points have the following Cartesian coordinates and weights:  
 $\mathbf{P}_0 = (0, 0)$ ,  $w_0 = 1$ ;  $\mathbf{P}_1 = (3, 4)$ ,  $w_1 = 2$ ;  $\mathbf{P}_2 = (10, 5)$ ,  $w_2 = 4$ ;  $\mathbf{P}_3 = (10, 0)$ ,  $w_3 = 1$ .  
compute the curvature at  $t = 0$ .
3. Find the center of the osculating circle for the point  $\mathbf{P}_{[0,1]}(0)$  on the curve in Problem 2.
4. Find the area of the triangle with vertices  $(1, 2)$ ,  $(5, 5)$ ,  $(6, 1)$ .
5. Find the vector that is perpendicular to the triangle with vertices  $(1, 1, 1)$ ,  $(4, 5, 1)$ , and  $(1, 4, 5)$ .
6. Find the coordinates of the point  $(6, 7, 3)$  after rotating it  $90^\circ$  about the axis that goes through point  $(1, 2, 3)$  with a direction vector  $(1, 2, 2)$ .

Hand in this homework in class on 15 September.