Quiz #1 (CSE4190.667)

March 23, 2015 (Monday)

Name: _______________ **Dept:** _______________ **ID No:** _______________

1. (10 points) Given a cubic Bézier curve $C(t) = \sum_{i=0}^{3} \mathbf{b}_i B_i^3(t)$, $0 \leq t \leq 1$, and a linear curve $L(t) = (1-t)\mathbf{b}_0 + t\mathbf{b}_3$, $0 \leq t \leq 1$, connecting the two endpoints of $C(t)$, represent the difference curve:

$$D(t) = C(t) - L(t) = \sum_{i=0}^{3} \mathbf{d}_i B_i^3(t), \quad 0 \leq t \leq 1,$$

as a cubic Bézier curve, by constructing the four control points $\mathbf{d}_i$, for $i = 0, 1, 2, 3$.

2. (10 points) Degree reduce the cubic Bézier curve $C(t) = \sum_{i=0}^{3} \mathbf{b}_i B_i^3(t)$, $0 \le t \le 1$, with four control points:

$$\mathbf{b}_0 = \begin{bmatrix} 0 \\ 0 \end{bmatrix}, \quad \mathbf{b}_1 = \begin{bmatrix} 1 \\ 1 \end{bmatrix}, \quad \mathbf{b}_2 = \begin{bmatrix} 2 \\ 4 \end{bmatrix}, \quad \mathbf{b}_3 = \begin{bmatrix} 3 \\ 9 \end{bmatrix},$$

to a linear Bézier curve $L(t) = \sum_{j=0}^{1} \mathbf{l}_j B_j^1(t)$, $0 \le t \le 1$, by computing the two control points $\mathbf{l}_0$ and $\mathbf{l}_1$.