4. A piece-wise polynomial, Bezier approximation curve of order $n = 2$ needs to be designed to fit a set of points $\{\mathbf{p}_k\}$.

(a) What set of blending functions need to be specified and, hence, what is the parametric form of the curve $Q(u)$? [4]

(b) Using your previous answer, or otherwise, derive a *matrix* form of $Q(u)$. [6]

(c) Write down the first derivative of the curve, $Q'(u)$, and state the boundary condition which will ensure C_1 continuity for successive piecewise approximations. [4]

(d) Given $\Delta Q(u) = Q(u + \delta) - Q(u)$ and $\Delta^2 Q(u) = \Delta Q(u + \delta) - \Delta Q(u)$, what are the constant terms,

$$\{\Delta^2 Q(0), \Delta Q(0), Q(0)\}$$

needed to accelerate the drawing of $Q(u)$? [8]

(e) How many multiplies and adds would be needed to trace part of a quadratic Bezier patch over one $u + \delta u$ or $v + \delta$ step? [3]