5) $Q_x = \int y \, dA$ $\qquad$ $\int_A \xi_1^k \xi_2^l \xi_3^m \, dA = 2A \frac{k! \, l! \, m!}{(2+k+l+m)!}$

$\xi_1 = 1 - r - s$

$\xi_2 = r$

$\xi_3 = s$ $\qquad$ $A = \frac{1}{2}(x_{21} y_{31} - x_{31} y_{21})$

$A = \int_A dA \qquad k = l = m = 0$

$A = 2A \frac{1}{2!} = A$

$Q_x = \int y \, dA$

$y = N_1 y_1 + N_2 y_2 + N_3 y_3$

$= \xi_1 y_1 + \xi_2 y_2 + \xi_3 y_3$

$Q_x = \int \xi_1 y_1 \, dA + \int \xi_2 y_2 \, dA + \int \xi_3 y_3 \, dA$

$= 2A y_1 \frac{1}{6} + 2A y_2 \frac{1}{6} + 2A y_3 \frac{1}{6}$

$= \frac{1}{3} A (y_1 + y_2 + y_3)$

By comparison, if y_1 and y_2 are on the x axis,

$Q_x = \frac{y_3}{3} A$, which matches our result.