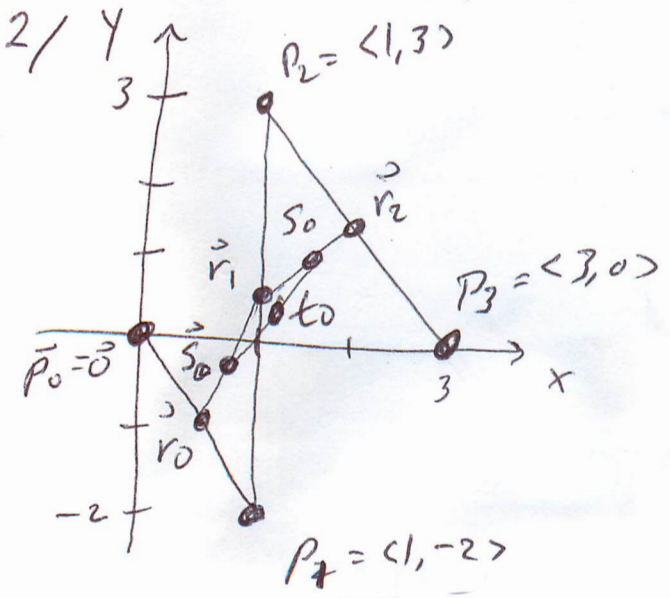
Homework #7 - Answers - 155A - Winter 2019

1/ The four control points for $\vec{q}(u)$ are:

$P_0 = 0 \quad P_1 = 2 \quad P_2 = 10 \quad P_3 = 8$

The convex hull of the control points is $[0, 10]$.
An upper bound for $\vec{q}(u)$, $u \in [0,1]$ is $\boxed{10}$.

2/



$\vec{r}_0 = \langle \frac{1}{2}, -1 \rangle$

$\vec{r}_1 = \langle 1, \frac{1}{2} \rangle$

$\vec{r}_2 = \langle 2, \frac{3}{2} \rangle$

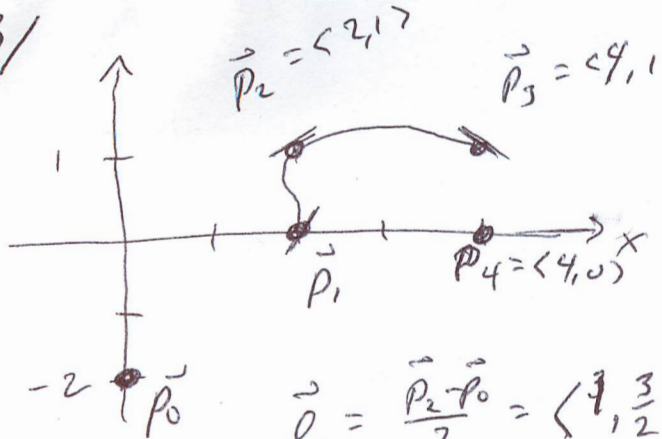
$\vec{s}_0 = \langle \frac{3}{4}, \frac{-1}{4} \rangle$

$\vec{s}_1 = \langle \frac{3}{2}, 1 \rangle$

$\vec{t}_0 = \langle \frac{9}{8}, \frac{3}{8} \rangle$

Second half has control points: $\vec{t}_0, \vec{s}_1, \vec{r}_2, \vec{P}_3$

3/



$\vec{l}_1 = \frac{\vec{P}_2 - \vec{P}_0}{2} = \langle 1, \frac{3}{2} \rangle$

$\vec{l}_2 = \frac{\vec{P}_3 - \vec{P}_1}{2} = \langle 1, 1/2 \rangle$

Starts at $\vec{P}_1$
Ends at $\vec{P}_3$
Slope at $\vec{P}_1$ is $3/2$
Slope at $\vec{P}_2$ is $1/2$
Slope at P_3 is $-1/2$

$\vec{P}_1^{+} = \langle 2, 0 \rangle + \frac{1}{3}\vec{l}_1 = \langle \frac{7}{3}, \frac{1}{2} \rangle$

$\vec{P}_2^{-} = \vec{P}_2 - \frac{1}{3}\vec{l}_1 = \langle \frac{5}{3}, \frac{5}{6} \rangle$

Control points are: $\vec{P}_1, \vec{P}_1^{+}, \vec{P}_2^{-}, \vec{P}_2$