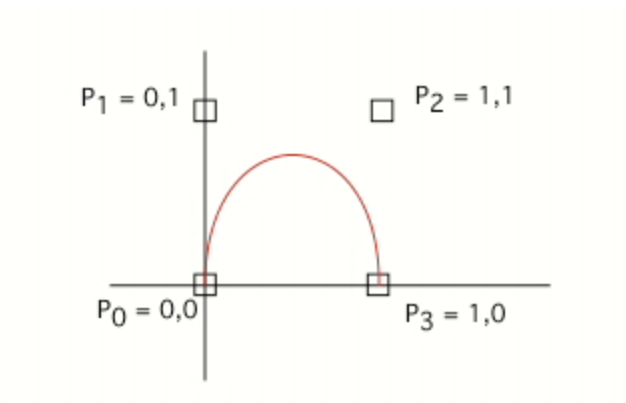
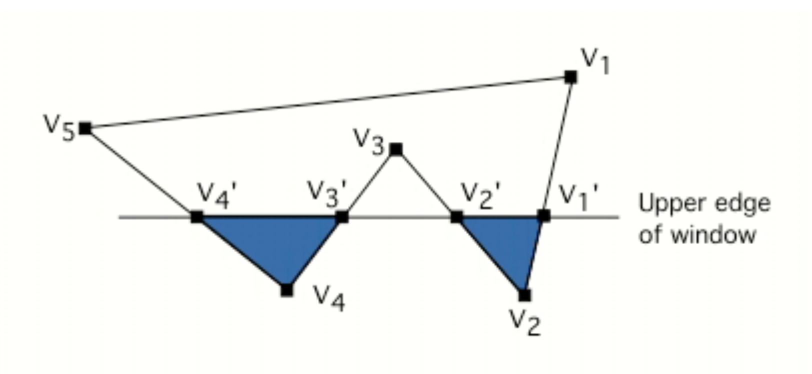
3. The four control points for a cubic Bezier curve are shown in the figure below. The blending functions are,

- for P_0, `(1 - u)`^{3}
- for P_1, `3u(1 - u)`^{2}
- for P_2, `3u`^{2}`(1 - u)`
- for P_3, `u`^{3}

Calculate the exact value of the coordinates of the curve at `u = 1/2`. Using this information and what you know about how the slope of the curve must behave at the endpoints, draw a reasonably accurate picture of the entire curve from P_0 to P_3. **Answer**: The blending function values for u=1/2, in order are: 1/8, 3/8, 3/8, 1/8. Using these as the weights for the four x values, 0, 0, 1, 1, gives a weighted sum of x=1/2, as we'd expect. Weighting the y values 0, 1, 1, 0, gives a weighted sum of 3/4, so the point is P(1/2) = (1/2, 3/4), which is within the convex hull (the square). Below we show the Bezier curve drawn in a standard drawing application, using the same control points. The curve at each endpoint is vertical, as it must be, because the corresponding control points are directly above the endpoints.



4. This question focuses on clipping the five-sided polygon shown below against the upper edge of the rectangular window. The Sutherland-Hodgeman polygon clipping algorithm creates a single polygon and in this case will produce a spurious line along part of the upper boundary. The Weiler-Atherton algorithm can build more than one polygon and does not leave a spurious line. Show how the Weiler-Atherton algorithm traces the appropriate boundaries as it moves around the polygon and window edge, starting at vertex V_1. *Only* consider clipping against the *upper* window edge in this question.



Answer: This answer is virtually identical to the illustration in Fig. 6-25 in the text. Starting at V_1, the three vertices V_1' and V_2 and V2' are retained. Then the path turns right at the boundary, ending at V_1', completing the first polygon. The algorithm resumes at V_3, and follows a similar procedure to create the polygon V_3', V_4, V_4'.

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