

**CS 779**  
**Fall 2002**  
**Assignment 2**  
**Due: Monday, October 21**

1. (5 points) Page 123/124, exercise 4.
2. (10 points) Page 129, exercise 1.
3. (10 points) Page 146, exercise 1.
4. (5 points) Page 163, exercise 1.
5. (20 points) Extend your curve editor from assignment 1 to draw cubic Hermite curves using Neville's algorithm for Hermite curves, with the following features:
  - Left mouse to place new point, drag to place the vector.
  - Right mouse to click-and-drag existing point/vector-head.
  - Menu option to clear curve from screen
  - Menu option to switch between Lagrange and Hermite drawing.
  - Menu option to select between drawing
    - Just the curve
    - The curve plus the control points (which should be labeled  $P_0$ ,  $\vec{v}_0$ ,  $P_1$ ,  $\vec{v}_1$  etc.).
    - The curve plus the control points (labeled or unlabeled, your choice), plus the lower degree curves used to construct the curve. For example, for a degree curve, your display should look somewhat similar to Figure 3.1, expect that you (a) you will be drawing a cubic, and (b) you do not need the labels  $P_{01}(t)$ ,  $P_{12}(t)$ , or  $P_{012}(t)$ . For clarity, draw your curves in different colours.

You should be able to draw Hermite curves with at least 100 connected segments.

You will need to specify the nodes  $t_0 \dots t_n$ . Initially set  $t_0$  to 0, and then set  $t_{i+1}$  to  $t_i + 1$ . Provide a reasonable mechanism allow the user to change the values of the nodes.

6. (Extra credit: 5 points) In your program, create a second window where you draw a diagram similar to Figure 3.3, except that (a) you provide a mechanism for selecting  $t$  and draw the diagram for the particular value of  $t$ ; (b) at the nodes you give the coordinates for the values rather than  $P_i$ ,  $P_{ij}(t)$  etc., and (c) in the other window, when drawing with the third option, you also draw the points whose coordinates you give in part (b).

Note that for each value of  $t$  (other than the nodes) corresponds to a point on a single Hermite segment. Thus, even if you Hermite curve has 100 segments, in the second window your diagram will still look like Figure 3.3 (rather than 100 linked Figure 3.3's).