

CS 261 Fall 2011

Lagrange Interpolation Polynomials Pseudocode

INPUT: vector  $x$ ; vector  $y = f(x)$ ; a point to evaluate  $z$

OUTPUT:  $Pz$  Lagrange polynomial  $P(x)$  evaluated at  $z$

**Step 1** Initialize variables. Set  $Pz$  equal zero. Set  $n$  to the number of pairs of points  $(x, y)$ . Set  $L$  to be the all ones vector of length  $n$ .

**Step 2** For  $i = 1$  to  $n$  do ...

**Step 3** For  $j = 1$  to  $n$  do Step 4.

**Step 4** If  $i \neq j$  then  $L_i = (z - x_j)/(x_i - x_j) * L_i$

**Step 5**  $Pz = L_i * y_i + Pz$

**Step 6** Output  $Pz$ . Stop.

Note that for error checking, a Step 0 can be added to check

- (i) that  $x$  and  $y$  are the same length,
- (ii) that  $x$  and  $y$  each have at least two components, and
- (iii) that no two entries in  $x$  are the same.

For instance, if the lengths are different, then generate an error message such as “The method failed since  $x$  and  $y$  are not the same length.”