Write a subroutine to evaluate the Lagrange interpolant for a set of knots $(x_i, y_i), \ i = 1 : n + 1,$ at the set of independent values $w_i, \ i = 1 : k$. The subroutine should take as input the knots as vectors $x$ and $y$ and the evaluation points as the vector $w$. Your code should return the values $P(w_i), \ i = 1 : k$ in the vector $p$. Your first line should be

function p = lagrangeval(x,y,w)

Notes

1. As usual, make sure you document your code and be careful about division by zero.

2. I will send a test routine which will use various values of $n$ and $k$.

3. You will need to use Matlab’s size function to find $n$ and $k$.

4. You can use any method you like to find $p$, but Neville’s iteration is fast (and there is pseudo code in section 3.2 of our text). You can directly evaluate the Lagrange expression if you like, and (while I don’t recommend it) you can solve the Vandermonde system using the matlab operator \.

5. Matlab vectors begin with a first element, but our theory has been indexing with a zero$^{th}$; if you use our text or my notes, you will need to increment your indices by 1.

6. You may want to play with Matlab’s plot routine to visualize your output.