MATH 352 - PROJECT

SIERRA BATTAN, JACK BROCKWAY, & RANDY CHEN

Program Guide:

- *NCIS.java* is our main program files that reads the user's input, moves the points into our data structures, calls our *tridAlgo* function (which is our subroutine that solves a tridiagonal system of equations), calls our *ncisAlgo* function, and prints out our findings.
- Note: these are the assumptions we have made for our program:
  - All inputs are of numeric form (i.e., "cat dog" is an invalid point).
  - All inputs are entered in ascending order.
- **Usage Instructions:**
  - Launch a terminal
  - Navigate to the folder: *BBC352Project*
  - Compile our program: *javacNCIS.java*
  - Launch our program: *javaNCIS*
  - Input all points on new lines: *x y*
  - When done entering points, write: *done*
  - Our program will then output the resulting, simplified, natural cubic interpolation spline. ☺

Natural Cubic Interpolation Splines:

Natural cubic interpolation splines are blah blah blah. You can solved them by first blah blah blah, using blah blah blah. The result is a piecewise, C^2 function, which can be rewritten in many different ways.

Test Cases:

- Test 1:
  Input: $(1,2),(2,3),(3,5)$
  Result: $S(x) =$
  $S_0(x) = 2.0 + 0.75(x-1.0) + 0.0(x-1.0)^2 + 0.25(x-1.0)^3$
  $S_1(x) = 3.0 + 1.5(x-2.0) + 0.75(x-2.0)^2 + -0.25(x-2.0)^3$
- Test 2: (Textbook Problem 9.2.32)
  Input: $(1,0),(2,1),(3,0),(4,1),(5,0))$
  Result: $S(x) =$
  $S_0(x) = 0.0 + 1.7142857\ldots(x-1.0) + 0.0(x-1.0)^2 + -0.7142857\ldots(x-1.0)^3$
  $S_1(x) = 1.0 + -0.4285714\ldots(x-2.0) + -2.1428571\ldots(x-2.0)^2 + 1.5714285\ldots(x-2.0)^3$
  $S_2(x) = 0.0+1.1102230\ldots E-16(x-3.0)+2.5714285\ldots(x-3.0)^2+-1.5714285\ldots(x-3.0)^3$
  $S_3(x) = 1.0 + 0.4285714\ldots(x-4.0) + -2.1428571\ldots(x-4.0)^2 + 0.7142857\ldots(x-4.0)^3$
- Test 3: (Textbook Problem 9.2.41)
  Input: $(0,1),(1,2),(2,3),(3,4),(4,5)$
  Result: $S(x) =$
  $S_0(x) = 1.0 + 1.0(x-0.0) + 0.0(x-0.0)^2 + 0.0(x-0.0)^3$
  $S_1(x) = 2.0 + 1.0(x-1.0) + 0.0(x-1.0)^2 + 0.0(x-1.0)^3$
  $S_2(x) = 3.0 + 1.0(x-2.0) + 0.0(x-2.0)^2 + 0.0(x-2.0)^3$
  $S_3(x) = 4.0 + 1.0(x-3.0) + 0.0(x-3.0)^2 + 0.0(x-3.0)^3$