1) (2 pts) Use a cubic spline to do Problem 3 of Homework 17. Compare your relative errors to those from Table 1 in the Cubic Spline notes.

2) (4 pts) We have examined the case where we want to estimate the value of y^* for a given x^* using interpolation. What if the situation were reversed? What if we know the value of y^* and we want to estimate the corresponding x^*? This is called inverse interpolation. This is a much more challenging problem because the function $y = f(x)$ frequently does not pass the horizontal line test (meaning there can be multiple x^* values for a given y^*). However in the case that the function in the table is strictly increasing or decreasing, inverse interpolation is easy. You simply reverse the meanings of x and y in the discussions we have had.

   Use cubic splines, inverse interpolation and the data in the file `hw18.dat` to estimate the values of x^* for $y^* = 0.30, 0.75, 0.91$. Compute the relative errors in x^* given that this is a table of $y = \sin(x)$, The exact values are $x = \sin^{-1}(y)$.

3) (3 pts) Suppose the graph of your table of values looks like the one shown in Figure 1 and that you wanted to estimate the smaller of the x^* values that correspond to the indicated y^* value. The graph does not pass the horizontal line test so the approach in Question 1 won't work here. Describe the computational process you would use to do this. You don't have to write a program; just describe what you would do.

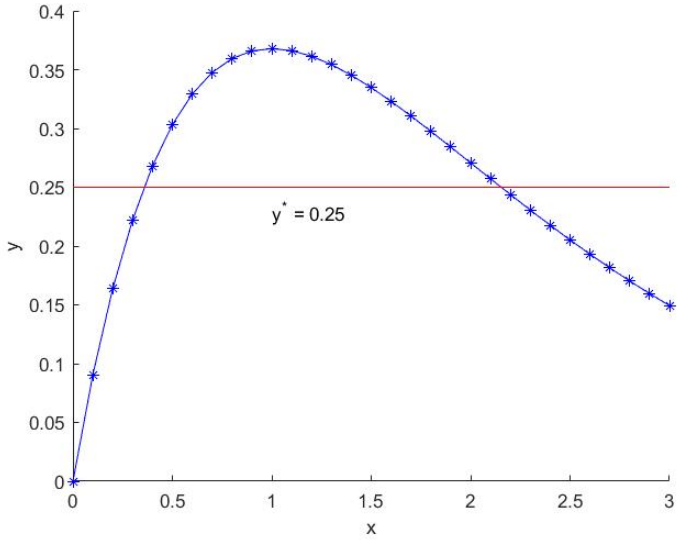

Figure 1: Table of values for Question 2.