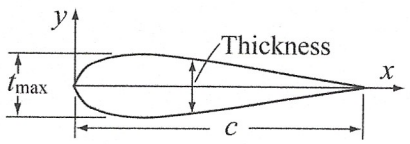
Problem 4.26 (modified)

26. The surface of many airfoils can be described with an equation of the form

$$y = \pm \frac{tc}{0.2}\left[a_0\sqrt{x/c} + a_1(x/c) + a_2(x/c)^2 + a_3(x/c)^3 + a_4(x/c)^4\right]$$



where t is the maximum thickness as a fraction of the chord length c (e.g., $t_{max} = ct$). Given that $c = 1$ m and $t = 0.2$m, the following values for y have been measured for a particular airfoil:

Above is a scan of a portion of problem 4.26 from Gilat. We're going to modify the problem slightly. Our script will take its input from a file having the following format:

```
1       c(m)
0.2     t(m)
0.01    increment(m)
        x(m)      y(m)
        0.15      0.08909
        0.35      0.09914
        0.5       0.08823
        0.7       0.06107
        0.85      0.03421
```

The script will calculate points along the airfoil. The x values in the output file vary from 0 to c with the increment between points taken from the "increment" in the input file. The output file looks like this:

```
          x(m)            y(m)
        0.0000          0.0000
        0.0100          0.0284
        0.0200          0.0393
        0.0300          0.0473
        0.0400          0.0538
        0.0500          0.0592
        0.0600          0.0640
           .               .
           .               .
           .               .
        0.9600          0.0112
        0.9700          0.0090
        0.9800          0.0067
        0.9900          0.0044
        1.0000          0.0021
```

The output file has 2 columns, each 15 characters wide.

Problem 4.26 (modified)

Your job is to write the script. It should prompt for the input and output filenames. It should read the input file. Note that the numbers in the input file will be different from the ones shown here, so your output file will have different numbers depending on the input file. Write a system of 5 equations and 5 unknowns and solve them to find a_0, a_1, a_2, a_3 and a_4. Use c and increment to build an x vector, then calculate values of y, one for every value in the x vector. Write the x and y vectors into an output file as shown above.