

Complete this program. You will need to write the functions described on the back page. Turn-in instructions are on the back page also.

```
// hw28.h
// Lastname Alpha <-- don't forget to change this!
#ifndef _MAIN_H
#define _MAIN_H

const int SIZE = 100000; // max # of elements in our array
// You'll need to add function prototypes here:

#endif
```

```
// hw28.cpp
// Lastname Alpha <-- don't forget to change this!

#include <cmath>
#include <fstream>
#include <iomanip>
#include <iostream>

#include "hw28.h"
using namespace std;

int main()
{
    ifstream fin( "data.txt" ); // Try to open the file
    if( fin.fail() ) return 1;

    double a[SIZE]; // An array to hold all data values.
    int n;           // Number of data values in the file.

    // Read in a data value ...
    while( fin >> a[n] ) // (keep reading until end-of-file)
        n = n + 1;         // ... and increment our count.

    fin.close(); // Done with the file: close it

    cout << n << " data values" << endl;
    cout << "mean: " << endl; // (Here you'll need to call
    cout << "var: " << endl; // the functions you have
    cout << "stdev: " << endl; // defined below)

    return 0;
}

// Your function definitions should go here:
```

The program reads real numbers from a file, then computes and prints the mean (average), variance, and standard deviation of those values.

$$\sum_{i=0}^{n-1} a_i$$

// Returns: $\mu = \frac{\sum_{i=0}^{n-1} a_i}{n}$, the average of the 'n' values in array 'a'

```
double mean( double a[], int n );
```

$$\sum_{i=0}^{n-1} (a_i - \mu)^2$$

// Returns: $\sigma^2 = \frac{\sum_{i=0}^{n-1} (a_i - \mu)^2}{n}$, the variance of the 'n' values in array 'a'

```
double variance( double a[], int n );
```

// Returns: $\sigma = \sqrt{\sigma^2}$, the standard deviation of the 'n' values in array 'a'

```
double sdev( double a[], int n );
```

Submit, stapled together: (1) this sheet with your name on it
(2) printed source code and header file listings
(3) a screen snapshot of your program running

Note that you must download the file named "data.txt" from the web site,
putting it in the same directory as the source code and header files:

