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Programming Assignment 1:
Copy Program—
Finding Average and Sample Variance
CS 2073, Engineering Programming
Spring Semester, 1992

The objectives of this assignment are to introduce you to:

- using the IBM PC, in the PC lab,
- using the Turbo Pascal editor to enter two files, one a Pascal program and one a data file, and
- using the Turbo Pascal system to compile and execute the Pascal program.
(During execution this program reads the data file.)

Your text has an appendix (Appendix J on pages A42–A71) that describes the use of Turbo Pascal on PC's. What follows below are very brief directions just to get you started.

(In what follows, **RET** means the “carriage return” or “enter key,” and **DEL** means the “delete” key. Use the special arrow keys, not the ones on the keypad.)

1. Follow the directions for the PC Lab: type “**CS2073_01 A:**” (or **B:**) in response to the “Enter your login name:” request. Use the ↓ key to go through the “Applications Menu” to “**Turbo Pascal 5.5**”. Type **RET**. Answer which drive contains your data disk. (Type “**A:**” for the upper one and “**B:**” for the lower.)
2. Type **RET**. Use arrow keys to get to “**File**” at the top. (You may already be there.)
3. Use ↓ key to get to “**New**”. Type **RET**.
4. Type in the Pascal source program given at the end of this handout, using arrow keys to get around, using **DEL** to get rid of unwanted items, and using **RET** to get a new line. (**DEL** removes the character *before* the cursor.)

5. Type **F10** to get back to the top menu.
6. Again arrow to "**File**", use ↓ key to "**Save**", and type **RET**. (The first time you will need to type in a file name, like "**A:\AVE.PAS**". (This assumes you are using the top drive.) The next "**Save**" will assume this same name. If you want to save using a different name, use "**WriteTo**".)
7. Now arrow to "**File**" and "**New**" as before and key in a short list of scores, say one that looks like:

```
80.0
100.0
90.0
```

(Be careful to have no **RET** after the final 90.0.)

8. Save this new file using the name "**A:\SCORES.DAT**", as in 5 and 6.
9. Arrow to "**Run**", ↓ key to "**Run**" below, and type **RET**.
10. If there are any compiler errors or run-time errors, you will pop into the proper place in the editor to change these errors. Start in again at step 8.
11. In case the program runs correctly, you can see the output on the screen either by quitting Turbo Pascal (see 12 below) or by typing **ALT/F5**. (Hold down the **ALT** key and type **F5**. This will toggle back and forth from the screen to Turbo.) The output should look like:

```
The scores are:
 80.0
100.0
 90.0
Number of scores: 3
Average of scores: 90.00
Sample variance of scores: 10.0
```

12. Quit the Turbo environment by arrowing to "**File**" and then ↓ key to "**Quit**" and then **RET**.
13. If you later want to change this program, arrow to "**File**", ↓ key to "**Load**", and type "**A:\AVE.PAS**", followed by **RET**.
14. Finally to get a listing of your program to turn in, first type **ESC**, then arrow to "**System Services**", then **RET**, then arrow to "**Run a DOS Command**", and finally type "**PRINT A:\AVE.PAS**" at the main DOS prompt. Type a final **RET**.

There are a number of "hot" keys that give shortcuts to allow you to work quicker. You can get to information about these keys using the "help" key **F1**. (**ESC** gets you out of help.) There are also shortcut keys within the Turbo editor, including **Home** to get to the beginning of a line, **Een** to go to the end of a line, **PgUp** to go

one page up, and **PgDn** to go one page down.

```
program average_and_dev;
(*-----
* Name: insert your name here
* Date: insert your due date here
* Course: CS 2073, Section 001
*-----
* Program: Compute the average and sample variance of a file of
*          scores.
* Algorithm: Scores are read, summed, and counted. Then the average
*            is computed. A second reading of the file allows the
*            sample variance to be calculated.
*-----
* Input: Input scores are real numbers, one to a line, in the
*         file named SCORES.DAT.
* Output: Output is the average and the sample variance.
*-----
*)
var
  average: real; (* average of scores *)
  samplevar: real; (* sample variance of scores *)
  count: integer; (* the number of scores read in *)
  score: real; (* the current score being read and processed *)
  sum: real; (* running sum of scores *)
  sumsq: real; (* the sum of squares of scores - average *)
  infile: text; (* internal name for the input file .)
begin (* average_and_dev *)
  assign(infile, 'SCORES.DAT');
  reset(infile);
  sum := 0.0;
  count := 0;
  writeln('The scores are:');
  while not eof(infile) do
  begin
    readln(infile, score);
    writeln(score:7:2);
    sum := sum + score;
    count := count + 1
  end;
  close(infile);
  (* if count <> 0 or 1, calculate average and sample variance *)
  if count = 0 then
    writeln('*** No scores, and empty file ***')
  else if count = 1 then
    writeln('*** Only one score ***')
  else
  begin
    average := sum/count;
    sumsq := 0;
    reset(infile);
    while not eof(infile) do
    begin
      readln(infile, score);
      sumsq := sumsq + sqr(score - average)
    end;
    close(infile);
    samplevar := sqrt(sumsq/(count - 1));
    writeln('Number of scores: ', count:1);
    writeln('Average of scores: ', average:3:2);
    writeln('Sample variance of scores: ', samplevar:3:2)
  end
end
end.
```