CLA CS-101 (A1)
Introduction to Computers
Spring 1995

Homework # 4
Due on Thursday 3/2/95

1 In this problem you will get a taste of what Pascal programming is like by using an example program. The program attached at the end of this homework is an implementation of the "weight control" example discussed in the textbook (Chapter 9, Pages 156-162). After you read the program and understand what it does, go through the steps enumerated below.

a. Using Emacs write the program in a file (call the file "dietwatch.p"). Don't forget to save your work frequently.

b. Using the "pc" command compile "dietwatch.p". If the compiler reports any error with your program, go back and fix the program using Emacs.

c. If the compiler does not report any errors, it means that it successfully understood "dietwatch.p" and translated it into an executable code, which is stored in "a.out". Type "a.out" at the Unix prompt to run it.

d. The solution to this problem should consist of a listing of "dietwatch.p" (you can obtain that using the "lpr" command). Also, you should submit a script showing the successful termination of steps b. and c. above.

2 In class, we discussed a program that computes grades statistics. Write a Pascal program that will perform that task. Your program should start by asking the operator (the person who will run the program) to enter the total number of students in the class. Next, the program should enter a loop where it asks for the particular grade of each student in the class. Finally, the program should print out the minimum grade, avrerage grade, and maximum grade for the class.

3 Answer the following questions (Handwriting the solution on paper or submitting a typed solution are both acceptable).

a. What do we mean by a *syntax* error? Give an example.
b. What do we mean by a *semantics* error? Give an example.
c. Why are semantic errors harder to debug than syntax errors.
d. What is the difference between an *interpreter* and a *compiler*? Why are these necessary to run programs written in high-level languages?

4 Explain why the following Pascal statements are erroneous. Find and fix all the bugs therein (there might be more than one).

```
◇ if (x = 2 or = 3) then y := 15 ;
◇ y = 2*(x + y ;
◇ writeln(Hello world') ;
◇ x + y := z ;
◇ while(x > 0 and y := 0) do
```

Good Luck!

```
program dietwatch(input,output);  (* Program for Problem-1 of Homework-4 *)

var
  Age, Weight, Height, BMR : integer ;
  Sex : char ;
  CaloriesIn, CaloriesOut : integer ;
  NoMilkEqv, NoVegEqv, NoFruitEqv, NoBreadEqv, NoMeatEqv, NoFatEqv : integer ;
  HrsVeryLight, HrsLight, HrsModerate, HrsHeavy : integer ;
  LbsPlus, LbsMinus : real  ;

begin
  writeln('    WELCOME TO THE DIET AND EXERCISE DIARY');
  writeln(' ');
  writeln('First I need some personal statistics to estimate');
  writeln('your basal metabolism rate -- how fast you burn');
  writeln('calories while resting.');
  writeln(' ');

  writeln('How old are you ?');
  readln(Age);
  writeln('What is your weight (in pounds) ?');
  readln(Weight);
  writeln('What is your height (in inches) ?');
  readln(Height);
  writeln('Type M if you are male, F if female.');
  readln(Sex);
  writeln(' ');

  writeln('Now I will record your exercise activities for the');
  writeln('last 24 hours:');
  writeln(' ');
  writeln('How many hours of very light work did you do?');
  readln(HrsVeryLight);
  writeln('How many hours of light work did you do?');
  readln(HrsLight);
  writeln('How many hours of moderate work did you do?');
  readln(HrsModerate);
  writeln('How many hours of heavy work did you do?');
  readln(HrsHeavy);
  writeln(' ');

  writeln('Now I will record your nutrition information for the');
  writeln('last 24 hours:');
  writeln(' ');
  writeln('How many portions of milk or equivalent did you have?');
  readln(NoMilkEqv);
  writeln('How many portions of vegetable or equivalent did you have?');
  readln(NoVegEqv);
```

```
  writeln('How many portions of fruit or equivalent did you have?');
  readln(NoFruitEqv);
  writeln('How many portions of bread or equivalent did you have?');
  readln(NoBreadEqv);
  writeln('How many portions of meat or equivalent did you have?');
  readln(NoMeatEqv);
  writeln('How many portions of fat or equivalent did you have?');
  readln(NoFatEqv);
  writeln(' ');

  CaloriesIn := NoMilkEqv*80 +
                NoVegEqv*25 +
                NoFruitEqv*40 +
                NoBreadEqv*70 +
                NoMeatEqv*55 +
                NoFatEqv*45 ;

  writeln('I have determined that your intake of calories was ',CaloriesIn);

  if (Sex = 'M') then
    BMR := 70
  else
    BMR := 55 ;

  writeln('I have determined that your BMR is ', BMR);

  CaloriesOut := BMR*24 +
                 BMR*(HrsVeryLight*1+HrsLight*2+HrsModerate*4+HrsHeavy*8) +
                 (CaloriesIn div 10);

  if (CaloriesIn>CaloriesOut) then
    begin
      LbsPlus := (CaloriesIn - CaloriesOut) / 1400 ;
      writeln('You had more calories than what you consumed.');
      writeln('This will add approx. ', LbsPlus, ' lbs to your weight.');
    end
  else
    begin
      LbsMinus := (CaloriesOut - CaloriesIn) / 1600 ;
      writeln('You consumed more calories than what you had.');
      writeln('This will take approx. ', LbsMinus, ' lbs off your weight.');
    end ;
  writeln('End of program! Bye!') ;
end.
```

```
(best) ~ % pc dietwatch.p
(best) ~ % a.out
    WELCOME TO THE DIET AND EXERCISE DIARY
First I need some personal statistics to estimate
your basal metabolism rate -- how fast you burn
calories while resting.

How old are you ?
29
What is your weight (in pounds) ?
163
What is your height (in inches) ?
70
Type M if you are male, F if female.
M

How many hours of very light work did you do?
4
How many hours of light work did you do?
7
How many hours of moderate work did you do?
3
How many hours of heavy work did you do?
1

How many portions of milk or equivalent did you have?
2
How many portions of vegetable or equivalent did you have?
4
How many portions of fruit or equivalent did you have?
3
How many portions of bread or equivalent did you have?
2
How many portions of meat or equivalent did you have?
3
How many portions of fat or equivalent did you have?
2

I have determined that your intake of calories was          775
I have determined that your BMR is          70
You consumed more calories than what you had.
This will take approx.  2.276250e+00 lbs off your weight.
End of program! Bye!
```