1996 Paper 1 Question 9

Programming in Modula-3

A student unfamiliar with Modula-3 wrote the following procedure:

```
PROCEDURE Stats () =
VAR m, v := 0.0;
BEGIN
  WITH n = IO.GetInt (),
       a = ARRAY [1..n] OF REAL DO
    FOR i := 1 TO n DO a[i] := IO.GetReal () END;
    FOR i := 1 TO n DO INC (m, a[i]) END;
    m := m / n;
    FOR i := 1 TO n DO INC (v, (a[i]-m)*(a[i]-m)) END;
    v := v / n;
    RETURN RECORD m, v;
  END;
END Stats;
```

Explain, to the extent that you can reconstruct them, the programmer's intentions.
[5 marks]

Comment on the legality of the code and indicate what the Modula-3 compiler's response would be to it. [5 marks]

How would you correct the procedure –

(a) following the external data format and internal data structure and algorithm intended by the programmer; [5 marks]

(b) re-writing it completely from scratch, possibly even having a different external data format (which should be specified). [5 marks]