MARKSCHEME

November 2003

COMPUTER SCIENCE

Standard Level

Paper 2

6 pages

1.   (a)   `BOARD[4,5] = 2;`   *[1 mark]*

         (b)   `BOARD[4,4] = 0;`   *[1 mark]*

         (c)   new position `[4,2]`;
                `BOARD[3,3] = 2 BOARD[4,2] = 2 BOARD[2,4] = 0;`   *[4 marks]*

         (d)

ROW	COL	AR	AC	TR	TC	FOUND	BOARD[AR,AC]	BOARD[TR,TC]	BOARD[ROW,COL]
3	3	2	2			**false**	0		1
3	3	2	3			**false**	0		1
3	3	2	4	1	5	**true**	2	1	0
1	5	2	5	1	5	**true**	1	1	0

increase `AC`;
calculate `TR`;
calculate `TC`;
FOUND **true**;
`BOARD[AR, AC];`
`BOARD[TR,TC];`
`BOARD[ROW,COL];`
`ROW;`
`COL;`   *[9 marks]*

Note that the values in the table depend on the way in which the candidate completes the table and line 3 may be ... **false** *2 0 1 in the last three columns.*
Do not penalise candidates if the value in the final row of `AC` *is not increased to 5.*

         (e)   since `COL, ROW` and `FOUND` are pass by reference;
                `MOVE` can be called repeatedly with `ROW` and `COL`;
                until `FOUND = FALSE;`   *[3 marks]*

         (f)   there are 8 statements as follows:

Statement	Subscript overflow
AR<--ROW-1	<1
AC<--COL-1	<1
TR<--2*AR-ROW	<1 OR >10
TC<--2*AC-COL	<1 OR >10
AC<--AC+1	>10
AR<--AR+1	>10
(AR<ROW+2)	>10
AC<COL+2	>10

Award 1 mark for each statement identified and the overflow that could occur.   *[6 max]*

Do not penalise candidates twice if they do not recognise that TR+TC need to be checked in both limits. Accept the limits given in any form.

(g)   for example:

```
procedure SCORES(val BOARD[1..10,1..10] integer array)
   declare COUNT1, COUNT2, SCORE1, SCORE2 integer
   SCORE1 <-- 0
   SCORE2 <-- 0
   for COUNT1 <-- 1 upto 10
      for COUNT2 <-- 1 upto 10
         if BOARD[COUNT1,COUNT2]=1 then
            SCORE1 <-- SCORE1+1
         elseif BOARD[COUNT1, COUNT2] = 2 then
            SCORE2 <-- SCORE2+1
         endif
      endfor
   endfor
   output ("Black scores",SCORE1,"White scores",SCORE2)
   if SCORE1 > SCORE2 then
      output ("Black wins")
   elseif SCORE2 >SCORE1 then
      output ("White wins")
   else
      output ("A draw")
   endif
endprocedure
```

Award marks as follows.
correct parameters **[1 mark]**;
declaration **[1 mark]**;
initialization of variables **[1 mark]**;
double loop to cover the board **[1 mark]**;
correct check and allocation of scores **[2 marks]**;
output of scores for each colour **[1 mark]**;
correct check for winner and output **[1 mark]**;
correct output if draw **[1 mark]**.   **[6 marks]**

2. (a)   cookies and web bugs cannot reach information from HD or damage files;
         viruses and worms attach themselves to files and can damage them;   *[2 marks]*

  (b)   bugs are designed to hide from user;
         so small that they cannot be seen;
         send back information to sender;
         build up profile of user;   *[2 marks max]*

  (c)   *Award [2 marks] for identifying a valid function of protocols and an outline, [1 mark] for
         an elaboration.*
         protocols ensure the receiving and sending computers can exchange data (weak);
         protocols such as parity checks (any valid example of a check);
         help to ensure data is received correctly;
         a protocol is a set of rules allowing systems to exchange data;   *[3 marks]*

  (d)   *Award [2 marks] for the following.*
         set up system to install cookie (web bug) on server / user profile / Intranet home
         page;

         set up system to study information picked up

         Award [1 mark] for any of the following advantages, up to [2 marks max].
         can see if unsuitable sites visited;
         check against plagiarism;
         forbidden activities such as chatroom / games;

         Award [1 mark] for any of the following disadvantages, up to [2 marks max].
         a lot of work to set up;
         tedious to monitor results;
         (to the student: lack of privacy);   *[6 marks max]*

  (e)   (i)   `width = 1 height = 1 border = 0;`   *[2 marks]*
                Award [1 mark] if one is missing.

         (ii)   school site for image directly;
                dubious.com indirectly;   *[2 marks]*

  (f)   *There should be two points. [1 mark] for each point; [1 mark] for an elaboration.*
         governments can spy on their citizens;
         check their computer for material of interest;
         e.g. membership of other political parties;
         police / military can track your surfing habits;   *[4marks]*

  (g)   *Award [1 mark] for each valid point and [1 mark] for an elaboration up to
         2 × [2 marks], there are many possibilities.*
         language *[1 mark]* people who want to participate have to learn English;
         banking/finance *[1 mark]* may not be able to participate without changing
         local conditions;
         inappropriate dress/behaviour *[1 mark]*.
         using US sites may expose them to images/activities not considered "the
         norm" in their own culture *etc.*;   *[4 marks max]*

3. (a) a plausible cause of error in each case;

e.g. data by post could be:
badly written so that some details are typed into the computer but the barcode should be correctly entered;
lost in the post; *[2 marks]*

data filled in over the web could be:
prone to typo errors from the person who fills it in and this could include the identification number; *[2 marks]*

(b) **on the web:**
verification: the user could be asked to type in details again to confirm that they are the same each time. This especially for the ID number;

validation: the ID number has a specific format which is checked against the entry;
post codes, telephone numbers, date of purchase *etc.* can be checked for correct format / range;

by post:
ID input by barcode reader so probably no need to input twice. If there is a problem (found by validation) then it will be reported and either input again via the reader or the number typed in (in the case of crumpled card); *[4 marks]*

(c) *In each case award [1 mark] for identifying the process and [1 mark] for justification.*

batch process: is the sending of offers to those whose guarantee period is nearly finished;
this is suitable because:
done on a regular basis;
means looking at each record in turn to check the date (repetitive process)
needs no user intervention;

online process: is the response to telephone or website query;
this is suitable because:
a response is needed from the query whilst the person is actually using the site
(or in the case of the telephone the person answering is getting answer from the database whilst talking to the enquirer; *[4 marks]*

(d) *Award [1 mark] for each valid point and comparison made, e.g.:*
a direct file will mean quicker access to someone on the telephone;
especially if the file is large;
ID number of the machine makes a natural key for access;
can still be searched record by record when batch process carried out;
sequential file could be stored in order of date which would make batch process quicker;
provided customer knew date of purchase, this could also be efficient for search by customer; *[3 marks]*