

Past-paper walk-through

Boolean Expressions ■ 2.2

eXercise

Questions in this set

- 2016 Q3

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 3

2016 ■ Q3

A crossword puzzle grid is a two-dimensional rectangular array of black and white squares. Some of the white squares are labeled with a positive number according to the *crossword labeling rule*.

The crossword labeling rule identifies squares to be labeled with a positive number as follows. A square is labeled with a positive number if and only if

- the square is white and
- the square does not have a white square immediately above it, or it does not have a white square immediately to its left, or both.

Question 3

The squares identified by these criteria are labeled with consecutive numbers in row-major order, starting at 1.

The following diagram shows a crossword puzzle grid and the labeling of the squares according to the crossword labeling rule.

Question 3

[Diagram of a 7-row by 8-column crossword puzzle grid, with black and white squares, some white squares labeled with numbers. Row 1 (columns 1-8): black, 1, 2, black, black, 3, 4, 5. Row 2: 6, white(unlabeled), white(unlabeled), 7, black, 8, white(unlabeled), white(unlabeled). Row 3: 9, white(unlabeled), white(unlabeled), white(unlabeled), 10, white(unlabeled), black, black. Row 4: 11, white(unlabeled), black, 12, white(unlabeled), white(unlabeled), 13, 14. Row 5: black, black, black, 15, white(unlabeled), white(unlabeled), 16, white(unlabeled). Row 6: 17, 18, 19, white(unlabeled), black, 20, white(unlabeled), white(unlabeled). Row 7: 21, white(unlabeled), white(unlabeled), black, black, 22, white(unlabeled), black. Callout labels point to specific squares: “Labeled because no white square above and no white square to the left” points to square 8 (row 2, column 6); “Labeled because no white square to the left” points to square 9 (row 3, column 1); “Labeled because no white square above” points to square 14 (row 4, column 8); “Unlabeled” points to the two white squares in row 7, columns 7 and after square 22.]

Question 3

This question uses two classes, a Square class that represents an individual square in the puzzle and a Crossword class that represents a crossword puzzle grid. A partial declaration of the Square class is shown below.

```
k+kdpublic+w k+kdclass n+ncSquare
p
+w    c+cm/** Constructs one square of a crossword puzzle grid.
c+cm    *   Postcondition:
c+cm    *       The square is black if and only if isBlack is true.
c+cm    *       The square has number num.
c+cm    */
+w    k+kdpublic+w n+nfSquarep(k+ktboolean+w nisBlackp,+w k+ktint+w nnump)
+w    p+w c+cm/* implementation not shown */+w p
+w    c+c1// There may be instance variables, constructors, and methods that are not shown.
p
```