

13. The following matrix has non-zero elements on the diagonal, on the super-diagonal (the first diagonal above the main diagonal) and on the sub-diagonal (the first diagonal below the main diagonal). All the rest of the elements are zeros.

The following two-dimensional array named `MAT` of dimensions 6×6 is an example of such a matrix.

	MAT					
	[0]	[1]	[2]	[3]	[4]	[5]
[0]	7	7	0	0	0	0
[1]	1	2	1	0	0	0
[2]	0	9	-3	5	0	0
[3]	0	0	-5	6	4	0
[4]	0	0	0	7	7	2
[5]	0	0	0	0	5	1

- (a) State the value of `MAT[3][4]`. [1]

Method `isValidMatrix(N,A)` accepts an integer `N` and a two-dimensional array `A` of dimensions $N \times N$. It returns `True` if all elements below the subdiagonal and all elements above the superdiagonal are zeros and all elements on three diagonals are non-zeros; otherwise it returns `False`.

For example, `isValidMatrix(6,MAT)` returns `True` for the matrix `MAT` given above.

- (b) Construct an efficient algorithm for the method `isValidMatrix()`. [8]

Given the following recursive method `mystery()` with two formal parameters: `A` (a two-dimensional array) and `R` (an integer).

```
mystery(A,R)
    if R > 0 then
        return A[R][R-1] + mystery(A,R-1)
    else
        return 0
    end if
end mystery
```

- (c) Determine the value of variable `x` after execution of the following method call:

```
x = mystery(MAT,5)
```

where `MAT` is the two-dimensional array given. You must show your working. [4]

- (d) Deduce the purpose of the method `mystery(A,R)`. [2]