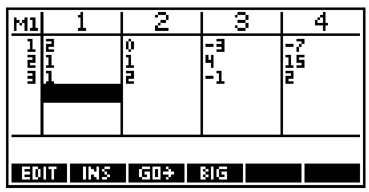
Eg. 10 Solve each of the systems of equations below, where possible, indicating in each case the nature of the system.

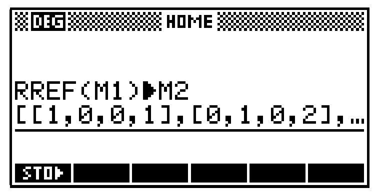
(a)
$$\begin{aligned} 2x - 3z &= -7 \\ x + y + 4z &= 15 \\ x + 2y - z &= 2 \end{aligned}$$

(b)
$$\begin{aligned} 2x - 3z &= -7 \\ x + y + 4z &= 15 \\ 3x + y + z &= 8 \end{aligned}$$

(c)
$$\begin{aligned} 2x - 3z &= -7 \\ x + y + 4z &= 15 \\ 3x + y + z &= 7 \end{aligned}$$

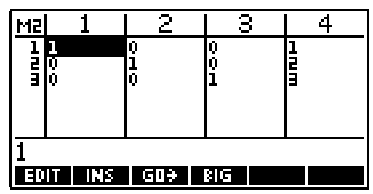
In each case the most efficient method is to use the function **RREF**. **RREF** stands for Reduced Row Echelon Form and will allow the user to deal with matrices which are singular.





(a) Entering the augmented matrix of coefficients into M1 (see right) we then use the **RREF** function, storing the result into **M2**.

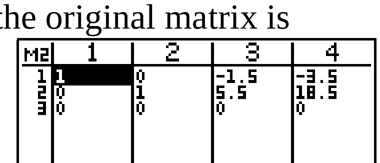
This result can be examined via the **Matrix Catalog**. It can be seen that the result is a diagonal of 1s, with the result given in the final column.



Here: *x = 1, y = 2, z = 3*

(b) Since the coefficients are similar, we can edit the augmented matrix in **M1** and then re-use the line in the **HOME** view.

In this case the final line of zeros indicates that the original matrix is singular and that there are an infinite number of valid solutions.



(c) A similar method for the third set of coefficients yields the result shown right. The final line of *0 0 0 1* indicates that there is no valid solution.