Exercise 22

In Exercises 19–22, determine the value(s) of h such that the matrix is the augmented matrix of a consistent linear system.

$$\begin{bmatrix} 2 & -3 & h \\ -6 & 9 & 5 \end{bmatrix}$$

Solution

The aim is to write the augmented matrix in triangular form.

$$\left[\begin{array}{cc|c} 2 & -3 & h \\ -6 & 9 & 5 \end{array}\right]$$

To make the bottom left entry 0, multiply the first row by 3 and add it to the second row.

$$\left[\begin{array}{cc|c} 2 & -3 & h \\ 0 & 0 & 5+3h \end{array}\right]$$

This last row implies that $0x_1 + 0x_2 = 5 + 3h$. In order for this to be a true statement, it's necessary that

$$5 + 3h = 0.$$

Solve for h.

$$h = -\frac{5}{3}$$