1. Determine the value(s) of h such that the matrix is the augmented matrix of a consistent linear system.

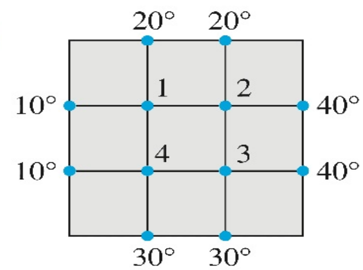
$$\begin{bmatrix} 2 & 3 & h \\ 4 & 6 & 7 \end{bmatrix}$$

2. Choose h and k such that the system has (a) no solution, (b) a unique solution, and (c) many solutions. Give separate answers for each part.

$$\begin{aligned} x_1 &+ hx_2 = 2 \\ 4x_1 &+ 8x_2 = k \end{aligned}$$

3. Assume the plate shown in the figure represents a cross section of a metal beam, with negligible heat flow in the direction perpendicular to the plate. Let $T_1,\ldots,T_4$ denote the temperatures at the four interior nodes of the mesh in the figure. The temperature at a node is approximately equal to the average of the four nearest nodes—to the left, above, to the right, and below.

$$T_1 = (10 + 20 + T_2 + T_4)/4, \quad or \quad 4T_1 - T_2 - T_4 = 30$$



a. Write a system of four equations whose solution gives estimates for the temperatures $T_1,\ldots,T_4$

b. Find the temperature at the interior points of the plate.

4. Find the interpolating polynomial that contains the given points.
Polynomial: $p(t) = a_0 + a_1 t + a_2 t^2$, points: (1,12),(2,15), and (3,16).