$$k_1 + k_2 + 2k_3 = b_1$$
$$k_1 + k_3 = b_2$$
$$2k_1 + k_2 + 3k_3 = b_3$$

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 0 & 1 \\ 2 & 1 & 3 \end{bmatrix}$$

$$|A| = 1(0-1) - 1(3-2) + 2(1-0)$$
$$|A| = -1 - 1 + 2$$
$$|A| = 0$$
$$\det(A) = 0$$

So, v_1, v_2, v_3 do not span.

② $v_1 = (2,2,2)$, $v_2 = (0,0,3)$, $v_3 = (0,1,1)$

Solution

$$b = k_1 v_1 + k_2 v_2 + k_3 v_3$$
$$(b_1, b_2, b_3) = k_1(2,2,2) + k_2(0,0,3) + k_3(0,1,1)$$
$$2k_1 = b_1$$
$$2k_1 + k_3 = b_2$$
$$2k_1 + 3k_2 + k_3 = b_3$$

$$A = \begin{bmatrix} 2 & 0 & 0 \\ 2 & 0 & 1 \\ 2 & 3 & 1 \end{bmatrix}$$