ex) $V = \mathbb{R}_4[x]$ $\quad \mathcal{B} = (1, x, x^2, x^3, x^4)$

$f = 1 + 2x^2 - 3x^4$

$g = 2x - 4x^2$

$h = 1 - 2x + 2x^2 - 3x^4$

Is h in $\operatorname{span}(f, g)$

$\Updownarrow$

$[h]_{\mathcal{B}}$ in $\operatorname{span}([f]_{\mathcal{B}}, [g]_{\mathcal{B}})$

$$[h]_B = \begin{pmatrix} 1 \\ -2 \\ 2 \\ 0 \\ -3 \end{pmatrix} \qquad [f]_B = \begin{pmatrix} 1 \\ 0 \\ 2 \\ 0 \\ -3 \end{pmatrix} \qquad [g]_B = \begin{pmatrix} 0 \\ 2 \\ -4 \\ 0 \\ 0 \end{pmatrix}$$

$$\Rightarrow \left(\begin{array}{cc|c} 1 & 0 & 1 \\ 0 & 2 & -2 \\ 2 & -4 & 2 \\ 0 & 0 & 0 \\ -3 & 0 & -3 \end{array}\right)$$

Solve this