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> #ii)
> with(LinearAlgebra) :
> v_1 := Vector([2*I, -1, 0, 0])

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$$v_1 := \begin{bmatrix} 2I \\ -1 \\ 0 \\ 0 \end{bmatrix} \quad (1)$$

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> v_2 := Vector([I, 0, 3, 1])

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$$v_2 := \begin{bmatrix} I \\ 0 \\ 3 \\ 1 \end{bmatrix} \quad (2)$$

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> u_1 := v_1 / Norm(v_1, 2)

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$$u_1 := \begin{bmatrix} \frac{2I}{5} \sqrt{5} \\ -\frac{\sqrt{5}}{5} \\ 0 \\ 0 \end{bmatrix} \quad (3)$$

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> u_2 := (v_2 - (u_1 • v_2) • u_1) / Norm(v_2 - (u_1 • v_2) • u_1, 2)

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$$u_2 := \begin{bmatrix} \frac{I}{255} \sqrt{255} \\ \frac{2\sqrt{255}}{255} \\ \frac{\sqrt{255}}{17} \\ \frac{\sqrt{255}}{51} \end{bmatrix} \quad (4)$$

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> w := Vector([3, 1 - I, 2 + I, 1])

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$$(5)$$

$$w := \begin{bmatrix} 3 \\ 1 - I \\ 2 + I \\ 1 \end{bmatrix} \quad (5)$$

$$> \text{proj} := (u_1 \cdot w) \cdot u_1 + (u_2 \cdot w) \cdot u_2$$

$$\text{proj} := \begin{bmatrix} 2 - \frac{2I}{5} + \frac{I \left(\left(\frac{32}{255} + \frac{2I}{51} \right) \sqrt{255} + \frac{\sqrt{255}}{51} \right) \sqrt{255}}{255} \\ \frac{1}{5} + I + \frac{2 \left(\left(\frac{32}{255} + \frac{2I}{51} \right) \sqrt{255} + \frac{\sqrt{255}}{51} \right) \sqrt{255}}{255} \\ \frac{\left(\left(\frac{32}{255} + \frac{2I}{51} \right) \sqrt{255} + \frac{\sqrt{255}}{51} \right) \sqrt{255}}{17} \\ \frac{\left(\left(\frac{32}{255} + \frac{2I}{51} \right) \sqrt{255} + \frac{\sqrt{255}}{51} \right) \sqrt{255}}{51} \end{bmatrix} \quad (6)$$

$$> \text{simplified} := \text{simplify}(\text{proj})$$

$$\text{simplified} := \begin{bmatrix} \frac{100}{51} - \frac{13I}{51} \\ \frac{25}{51} + \frac{55I}{51} \\ \frac{37}{17} + \frac{10I}{17} \\ \frac{37}{51} + \frac{10I}{51} \end{bmatrix} \quad (7)$$

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