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lecture 21, Ex A

1.

3a (12) $v_1 = v_1$

(12) $v_2 = v_3$

(12) $v_3 = v_2$

(12) $v_4 = v_4$

So we have

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

b. v_1, v_2 are eigenvectors of weight 1

Submod generated by v_2, v_3 is permutation matrix for (12)

Eigenvectors:

$u_1 = v_2 + v_3$ weight 1

$u_2 = v_2 - v_3$ weight -1

3a. $(12)\ v_1 = (-1)^2 x_1 \otimes x_1 = v_1$

$(12)\ v_2 = -x_1 \otimes x_1 - x_1 \otimes x_2 = -v_1 - v_2$

$(12)\ v_3 = -x_1 \otimes x_1 - x_2 \otimes x_1 = -v_1 - v_3$

$(12)\ v_4 = (x_1 + x_2) \otimes (x_1 + x_2)$

$= v_1 + v_2 + v_3 + v_4$

$(23)\ v_1 = (x_1 + x_2) \otimes (x_1 + x_2)$

$= x_1 \otimes x_1 + x_1 \otimes x_2 + x_2 \otimes x_1 + x_2 \otimes x_2$

$= v_1 + v_2 + v_3 + v_4$

$(23)\ v_2 = -x_1 \otimes x_2 - x_2 \otimes x_2$

$= -v_2 - v_4$

$(23)\ v_3 = -x_2 \otimes x_1 - x_2 \otimes x_2 = -v_3 - v_4$

$(23)\ v_4 = -x_2 \otimes -x_2 = v_4$

b.