33. Let $A = \lambda I + N$

where

$$N = \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{pmatrix}.$$

EXERCISE: Show that

$$A^k = \lambda^k I + k\lambda^{k-1} N + \binom{k}{2} \lambda^{k-2} N^2.$$

EXERCISE: Show that $x^k \equiv x^{(k)}$ is given by

$$x^k = \frac{A^k x^0}{\| A^k x^0 \|}.$$

What happens for large k?

34. We have $A v_1 = \alpha_1 v_1$ and $A v_2 = \alpha_2 v_2$

where $\alpha_1 \neq \alpha_2$ and v_1, v_2 are orthonormal.

HINT: Let

$$x^k \equiv x^{(k)} = c_k v_1 + s_k v_2$$

where

$$c_k \equiv \cos\theta_k \quad \text{and} \quad s_k \equiv \sin\theta_k.$$

Hence find λ_k and y.