ARNOLDIS Method.

Q $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 4 & 5 \\ 6 & 7 & 8 \end{bmatrix}$ $v = [1 \; 0 \; 0]^t$. $m = 2$

Find an orthonormal vector $\{v_1 \ldots v_3\}$ and a 3×2 Hessenberg matrix $\bar{H}_m$ s.t.

$A V_m = V_{m+1} \bar{H}_m$ where $V = (v_1, v_2, v_3)$

Soln :- Step 0 : $v_1 = \frac{v}{\|v\|} = [1 \; 0 \; 0]$

Step 1 :: for $k = 1$

$\hat{v} = Av_1 = [1 \; 3 \; 6]^t$

$h_{11} = v_1^T \hat{v} = 1$

$\hat{v} = \hat{v} - h_{11} v_1 = [0 \; 3 \; 6]^t$

$\cancel{h_{21} = v_1^T \hat{v}} =$

then,

$h_{21} = \|\hat{v}\|_2 = 6.7082$

and,

$V_2 = \frac{\hat{v}}{h_{21}} = [0 \quad 0.4472 \quad 0.8944]^t$

for $k = 2$

$\hat{v} = Av_2 = [\qquad]^t$

$h_{12} = v_1^T \hat{v} = 3.5777$

$\hat{v} = \hat{v} - h_{12} v_1$

$h_{22} = v_2^T \hat{v} = 12$

$\hat{v} = \hat{v} - h_{22} v_2 = [\qquad]$

$$\overline{\overline{\qquad\qquad}} \times \overline{\overline{\qquad\qquad}}$$

then, $h_{32} = \|\hat{V}\|_2 = 1$

$$V_3 = \frac{\hat{V}}{h_{32}} = [\qquad\qquad]$$

Ans = $\{V_1, V_2, V_3\}$ &

$$H = \begin{bmatrix} 1 & 3.5779 \\ 6.408 & 12 \\ 0 & 1 \end{bmatrix}$$