Question 1 *What are the eigenvalues of A?*

$$A = \begin{bmatrix} 2 & 6 \\ 0 & -5 \end{bmatrix}$$

List in order from smallest to largest. $\lambda_1 = \boxed{-5}$, $\lambda_2 = \boxed{2}$

Question 2 *What are the eigenvalues of A?*

$$A = \begin{bmatrix} 1 & 2 & -3 \\ 0 & 2 & 5 \\ 0 & 0 & 1 \end{bmatrix}$$

List in order from smallest to largest. $\lambda_1 = \boxed{1}$, $\lambda_2 = \boxed{2}$

Question 3 *What are the eigenvalues of A?*

$$A = \begin{bmatrix} -1 & 4 & 3 \\ 0 & 5 & -1 \\ 0 & 0 & 8 \end{bmatrix}$$

List in order from smallest to largest. $\lambda_1 = \boxed{-1}$, $\lambda_2 = \boxed{5}$, $\lambda_3 = \boxed{8}$

Question 4 *Is $\lambda = -1$ an eigenvalue of A?*

$$A = \begin{bmatrix} -1 & 4 \\ 3 & -2 \end{bmatrix}$$

Multiple Choice:

(a) *Yes*

(b) *No* ✓

Hint: *The eigenvalues of the echelon form of A are not necessarily the same as the eigenvalues of A. So row reducing to a triangular matrix and looking at the diagonal is not a valid method here. Instead consider the equation $(A - \lambda I)\vec{x} = \vec{0}$.*

Question 5 *Which of the following is an eigenvector of A?*

$$A = \begin{bmatrix} 3 & 0 & -1 \\ 2 & 3 & 1 \\ -3 & 4 & 5 \end{bmatrix}$$

Multiple Choice:

(a) $\vec{x} = \begin{bmatrix} 2 \\ 4 \\ 1 \end{bmatrix}$

(b) $\vec{x} = \begin{bmatrix} 2 \\ 2 \\ -2 \end{bmatrix}$ ✓

Hint: *A nonzero vector $\vec{x}$ is an eigenvector of A if $A\vec{x}$ is a multiple of $\vec{x}$, in other words if $A\vec{x} = \lambda\vec{x}$ for some λ.*

Question 6 *True/False: To find the eigenvalues of A are the entries in the main diagonal of U where U is an echelon form of A.*

Multiple Choice:

(a) *True*

(b) *False* ✓

Hint: *Question 4 is a counter example.*

Question 7 *True/False: The scalar zero is an eigenvalue of A if and only if A is not invertible.*

Multiple Choice:

(a) *True* ✓

(b) *False*

Hint: *Zero is an eigenvalue of A means $A\vec{x} = 0\vec{x}$ has a nontrivial ($\vec{x} \neq 0$) solution. Use the IMT.*