[5]   1.) Suppose $A \begin{bmatrix} -4 \\ 2 \end{bmatrix} = \begin{bmatrix} 12 \\ -6 \end{bmatrix}$, $A \begin{bmatrix} 3 \\ 8 \end{bmatrix} = \begin{bmatrix} 9 \\ 15 \end{bmatrix}$, $A \begin{bmatrix} 1 \\ 3 \end{bmatrix} = \begin{bmatrix} 2 \\ 6 \end{bmatrix}$, $A \begin{bmatrix} 3 \\ -1 \end{bmatrix} = \begin{bmatrix} -4 \\ -2 \end{bmatrix}$

State the 2 eigenvalues of A:

State 5 eigenvectors of A:

Circle T for true and F for false.

[5]   2.) If $b^2 - 4ac < 0$ then the solution to the initial value problem $ay'' + by' + cy = 0$, $y(0) = -1$, $y'(0) = -3$ is a complex valued function.   T   F

[5]   3.) If P and Q are polynomial functions with no common factors, then $y = Q(x)/P(x)$ is analytic at x_0 if and only if $P(x_0) \neq 0$. Moreover the radius of convergence of the power series for $Q(x)/P(x)$ about the point x_0 is $min\{||x_0 - x|| \mid x \in \mathbf{C}, P(x) = 0\}$ where $||x_0 - x|| = $ distance from x_0 to x in the complex plane.   T   F

[5]   3.) If P and Q are polynomial functions with no common factors, then $y = Q(x)/P(x)$ is analytic at x_0 if and only if $P(x_0) \neq 0$. Moreover the radius of convergence of the power series for $Q(x)/P(x)$ about the point x_0 is $min\{||x_0 - x|| \mid x \in \mathbf{R}, P(x) = 0\}$ where $||x_0 - x|| = $ distance from x_0 to x in the real line.   T   F