

# Mat01009 - Metodos Aplicados de Matematica I  
 # soluç o do Exercicio 10 da se c o 8.3 (D. Zill, Diff. Eq with App)  
 with(LinearAlgebra);

[&x, Add, Adjoint, BackwardSubstitute, BandMatrix, Basis, BezoutMatrix, BidiagonalForm, **(1)**  
 BilinearForm, CARE, CharacteristicMatrix, CharacteristicPolynomial, Column,  
 ColumnDimension, ColumnOperation, ColumnSpace, CompanionMatrix, ConditionNumber,  
 ConstantMatrix, ConstantVector, Copy, CreatePermutation, CrossProduct, DARE,  
 DeleteColumn, DeleteRow, Determinant, Diagonal, DiagonalMatrix, Dimension,  
 Dimensions, DotProduct, EigenConditionNumbers, Eigenvalues, Eigenvectors, Equal,  
 ForwardSubstitute, FrobeniusForm, GaussianElimination, GenerateEquations,  
 GenerateMatrix, Generic, GetResultDataType, GetResultShape, GivensRotationMatrix,  
 GramSchmidt, HankelMatrix, HermiteForm, HermitianTranspose, HessenbergForm,  
 HilbertMatrix, HouseholderMatrix, IdentityMatrix, IntersectionBasis, IsDefinite,  
 IsOrthogonal, IsSimilar, IsUnitary, JordanBlockMatrix, JordanForm, KroneckerProduct,  
 LA\_Main, LUdecomposition, LeastSquares, LinearSolve, LyapunovSolve, Map, Map2,  
 MatrixAdd, MatrixExponential, MatrixFunction, MatrixInverse, MatrixMatrixMultiply,  
 MatrixNorm, MatrixPower, MatrixScalarMultiply, MatrixVectorMultiply,  
 MinimalPolynomial, Minor, Modular, Multiply, NoUserValue, Norm, Normalize, NullSpace,  
 OuterProductMatrix, Permanent, Pivot, PopovForm, QRdecomposition, RandomMatrix,  
 RandomVector, Rank, RationalCanonicalForm, ReducedRowEchelonForm, Row,  
 RowDimension, RowOperation, RowSpace, ScalarMatrix, ScalarMultiply, ScalarVector,  
 SchurForm, SingularValues, SmithForm, StronglyConnectedBlocks, SubMatrix, SubVector,  
 SumBasis, SylvesterMatrix, SylvesterSolve, ToeplitzMatrix, Trace, Transpose,  
 TridiagonalForm, UnitVector, VandermondeMatrix, VectorAdd, VectorAngle,  
 VectorMatrixMultiply, VectorNorm, VectorScalarMultiply, ZeroMatrix, ZeroVector, Zip]

R1 := 2; R2 := 3; L1 := 1; L2 := 1; E := 60;

2  
 3  
 1  
 1  
 60 **(2)**

$A := \text{Matrix}\left(\left[\left[-\frac{R1}{L1}, -\frac{R1}{L1}\right], \left[-\frac{R1}{L2}, -\frac{(R1 + R2)}{L2}\right]\right]\right);$   
 $\begin{bmatrix} -2 & -2 \\ -2 & -5 \end{bmatrix}$  **(3)**

$b := \text{Matrix}\left(2, 1, \left[\frac{E}{L1}, \frac{E}{L2}\right]\right);$

$\begin{bmatrix} 60 \\ 60 \end{bmatrix}$  **(4)**

$u := \text{Multiply}(\text{MatrixInverse}(A), b);$

$$\begin{bmatrix} -30 \\ 0 \end{bmatrix} \quad (5)$$

$F(t) := u - \text{Multiply}(\text{MatrixExponential}(A \cdot t), u);$   
 $t \rightarrow u - \text{LinearAlgebra:-Multiply}(\text{LinearAlgebra:-MatrixExponential}(A t), u)$  (6)

$\text{with}(\text{plots});$   
 $[\text{animate}, \text{animate3d}, \text{animatecurve}, \text{arrow}, \text{changecoords}, \text{complexplot}, \text{complexplot3d},$  (7)

$\text{conformal}, \text{conformal3d}, \text{contourplot}, \text{contourplot3d}, \text{coordplot}, \text{coordplot3d}, \text{densityplot},$   
 $\text{display}, \text{dualaxisplot}, \text{fieldplot}, \text{fieldplot3d}, \text{gradplot}, \text{gradplot3d}, \text{implicitplot}, \text{implicitplot3d},$   
 $\text{inequal}, \text{interactive}, \text{interactiveparams}, \text{intersectplot}, \text{listcontplot}, \text{listcontplot3d},$   
 $\text{listdensityplot}, \text{listplot}, \text{listplot3d}, \text{loglogplot}, \text{logplot}, \text{matrixplot}, \text{multiple}, \text{odeplot}, \text{pareto},$   
 $\text{plotcompare}, \text{pointplot}, \text{pointplot3d}, \text{polarplot}, \text{polygonplot}, \text{polygonplot3d},$   
 $\text{polyhedra\_supported}, \text{polyhedraplot}, \text{rootlocus}, \text{semilogplot}, \text{setcolors}, \text{setoptions},$   
 $\text{setoptions3d}, \text{spacecurve}, \text{sparsematrixplot}, \text{surfdata}, \text{textplot}, \text{textplot3d}, \text{tubeplot}]$

$x(t) := F(t)[1];$   
 $t \rightarrow F(t)_1$  (8)

$y(t) := F(t)[2];$   
 $t \rightarrow F(t)_2$  (9)

$\text{display}(\text{plot}(x(t), t=0..4, \text{gridlines}='true', \text{color}='blue'), \text{plot}(y(t), t=0..2, \text{color}='red'));$

