```
> restart
> with(linalg) :
> with(LinearAlgebra) :
> AA := Matrix([[1, 2], [4, -5]])
```

$$AA := \begin{bmatrix} 1 & 2 \\ 4 & -5 \end{bmatrix} \tag{1}$$

```
> MatExp := MatrixExponential(AA, t) : evalf(MatExp[1, 1], 3);
```

$$0.137\, e^{-6.12 t} + 0.863\, e^{2.12 t} \tag{2}$$

```
> DerMatExp := map(diff, MatExp, t) : evalf(DerMatExp[1, 1], 3);
```

$$-0.84\, e^{-6.12 t} + 1.83\, e^{2.12 t} \tag{3}$$

```
> AAA := simplify(map(rcurry(eval, t='0'), DerMatExp))
```

$$AAA := \begin{bmatrix} 1 & 2 \\ 4 & -5 \end{bmatrix} \tag{4}$$

```
> restart
> with(PDEtools)
```

[CanonicalCoordinates, ChangeSymmetry, CharacteristicQ, CharacteristicQInvariants, ConservedCurrentTest, ConservedCurrents, ConsistencyTest, D_Dx, DeterminingPDE, Eta_k, Euler, FromJet, FunctionFieldSolutions, InfinitesimalGenerator, Infinitesimals, IntegratingFactorTest, IntegratingFactors, InvariantEquation, InvariantSolutions, InvariantTransformation, Invariants, Laplace, Library, PDEplot, PolynomialSolutions, ReducedForm, SimilaritySolutions, SimilarityTransformation, Solve, SymmetryCommutator, SymmetryGauge, SymmetrySolutions, SymmetryTest, SymmetryTransformation, TWSolutions, ToJet, build, casesplit, charstrip, dchange, dcoeffs, declare, diff_table, difforder, dpolyform, dsubs, mapde, separability, splitstrip, splitsys, undeclare] **(5)**

```
> Ecuacion := diff(z(x, y), x$2) + 5·diff(z(x, y), x, y) + 6·diff(z(x, y), y$2) = 0
```

$$Ecuacion := \frac{\partial^2}{\partial x^2} z(x, y) + 5 \left(\frac{\partial^2}{\partial y\, \partial x} z(x, y) \right) + 6 \left(\frac{\partial^2}{\partial y^2} z(x, y) \right) = 0 \tag{6}$$

```
> SolucionGeneral := pdsolve(Ecuacion)
```

$$SolucionGeneral := z(x, y) = \_F1(y - 3x) + \_F2(y - 2x) \tag{7}$$

```
> Ecua := diff(y(x, t), x) = diff(y(x, t), t$2)
```

$$Ecua := \frac{\partial}{\partial x} y(x, t) = \frac{\partial^2}{\partial t^2} y(x, t) \tag{8}$$

```
> SolGral := pdsolve(Ecua)
```

$$SolGral := (y(x, t) = \_F1(x)\ \_F2(t))\ \&\text{where}\left[\left\{\frac{d}{dx}\ \_F1(x) = \_c_1\ \_F1(x),\ \frac{d^2}{dt^2}\ \_F2(t) = \_c_1\ \_F2(t)\right\}\right] \tag{9}$$

```
> SolGralDos := build(SolGral)
```

(10)

$$SolGralDos := y(x,t) = \_C1\, e^{-\sqrt{-c_1}\,x}\, \_C2\, e^{\sqrt{-c_1}\,t} + \frac{\_C1\, e^{-\sqrt{-c_1}\,x}\, \_C3}{e^{\sqrt{-c_1}\,t}} \quad \textbf{(10)}$$

```
> restart
>
```