

```

> restart
> AA := array([ [2, 3], [1, 4] ])

```

$$AA := \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix} \quad (1)$$

```

> with(linalg) :
> MatExp := exponential(AA, t)

```

$$MatExp := \begin{bmatrix} \frac{3}{4} e^t + \frac{1}{4} e^{5t} & \frac{3}{4} e^{5t} - \frac{3}{4} e^t \\ \frac{1}{4} e^{5t} - \frac{1}{4} e^t & \frac{1}{4} e^t + \frac{3}{4} e^{5t} \end{bmatrix} \quad (2)$$

```

> restart
> AA := array([ [1, 1, 1], [1, -1, 1], [-1, 1, 1] ])

```

$$AA := \begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 1 \\ -1 & 1 & 1 \end{bmatrix} \quad (3)$$

```

> Xcero := array([1, 2, 3])

```

$$Xcero := \begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \quad (4)$$

```

> with(linalg) :
> MatExp := simplify(exponential(AA, t)) :
> evalf(MatExp[1, 1], 2)

```

$$0.076 e^{-1.7t} - 0.12 e^{1.4t} \sin(0.78 t) + 0.96 e^{1.4t} \cos(0.78 t) \quad (5)$$

```

> SOL := evalm( MatExp &* Xcero ) :
> SolUno := xx1(t) = simplify(SOL1) : SolDos := xx2(t) = simplify(SOL2) : SolTres := xx3(t)
= simplify(SOL3) :
> evalf(SolUno, 2); evalf(SolDos, 2); evalf(SolTres, 2)

```

$$\begin{aligned} xx_1(t) &= 1.2 e^{1.4t} \cos(0.78 t) - 0.11 e^{-1.7t} + 5.3 e^{1.4t} \sin(0.78 t) \\ xx_2(t) &= 1.2 e^{1.4t} \cos(0.78 t) + 0.79 e^{-1.7t} + 2.1 e^{1.4t} \sin(0.78 t) \\ xx_3(t) &= 3.3 e^{1.4t} \cos(0.78 t) - 0.34 e^{-1.7t} - 1.3 e^{1.4t} \sin(0.78 t) \end{aligned} \quad (6)$$

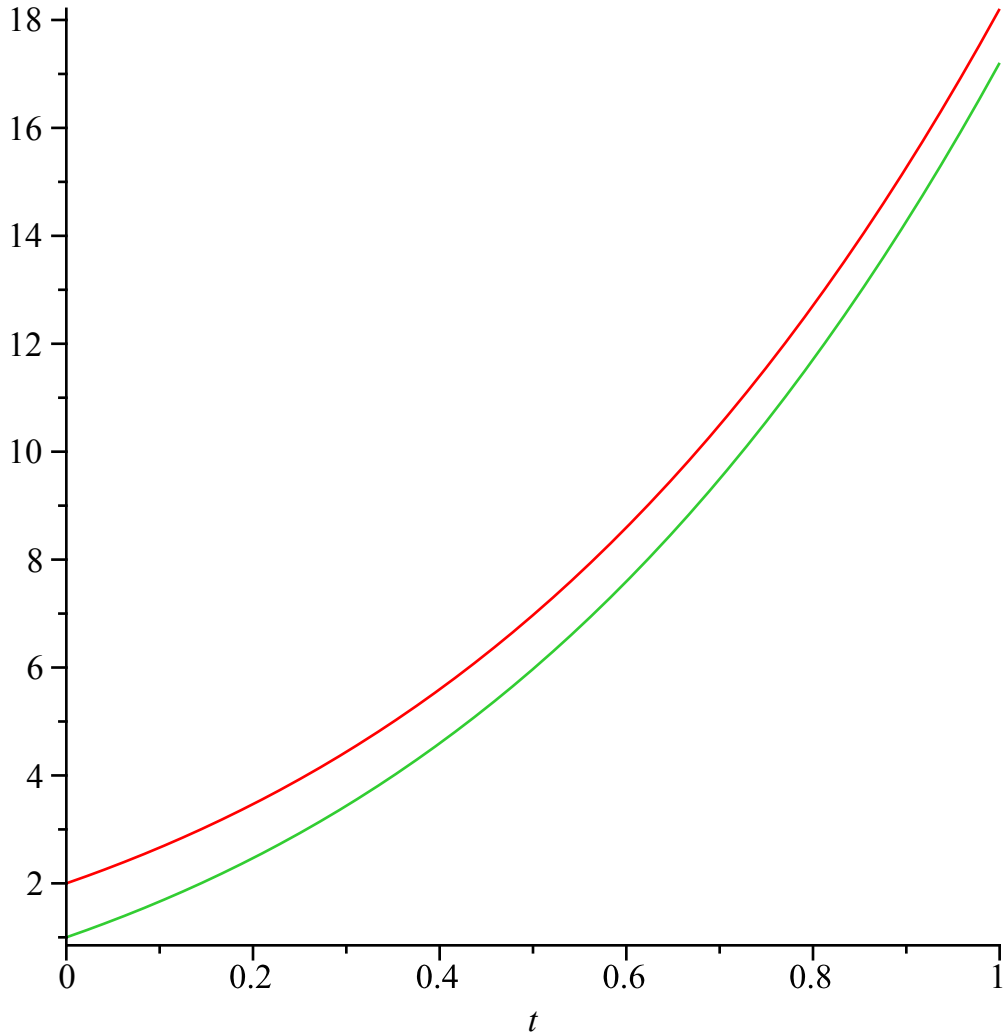
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> Sistema := diff(x1(t), t) = x1(t) + x2(t) + x3(t), diff(x2(t), t) = x1(t) - x2(t) + x3(t),
diff(x3(t), t) = -x1(t) + x2(t) + x3(t) :
> Condiciones := x1(0) = 1, x2(0) = 2, x3(0) = 3 :
> Solucion := dsolve({Sistema, Condiciones}) : evalf(Solucion1, 2); evalf(Solucion2, 2);
evalf(Solucion3, 2)

```

$$\begin{aligned} x_1(t) &= 5.0 e^{1.4t} \sin(0.78 t) + 1.1 e^{1.4t} \cos(0.78 t) - 0.087 e^{-1.7t} \\ x_2(t) &= 2.1 e^{1.4t} \sin(0.78 t) + 1.6 e^{1.4t} \cos(0.78 t) + 0.42 e^{-1.7t} \\ x_3(t) &= (-1.2 \sin(0.78 t) + 3.1 \cos(0.78 t)) e^{1.4t} - 0.20 e^{-1.7t} \end{aligned} \quad (7)$$

```
> plot([rhs(Solucion_1) + 1, rhs(SolUno)], t=0..1)
```



```
> comprobacion_1 := simplify(eval(subs(x_1(t) = rhs(SolUno), x_2(t) = rhs(SolDos), x_3(t)
= rhs(SolTres), simplify(lhs(Sistema_1) - rhs(Sistema_1)) = 0)))
comprobacion_1 := 0 = 0
```

(8)

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> comprobacion_2 := simplify(eval(subs(x_1(t) = rhs(SolUno), x_2(t) = rhs(SolDos), x_3(t)
= rhs(SolTres), simplify(lhs(Sistema_2) - rhs(Sistema_2)) = 0)))
comprobacion_2 := 0 = 0
```

(9)

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> comprobacion_3 := simplify(eval(subs(x_1(t) = rhs(SolUno), x_2(t) = rhs(SolDos), x_3(t)
= rhs(SolTres), simplify(lhs(Sistema_3) - rhs(Sistema_3)) = 0)))
comprobacion_3 := 0 = 0
```

(10)