Inhomogeneous linear systems of differential equations

Work for example 2 page 368
```
[ > with(linalg):
[ > A:=matrix(3,3,[-.5,0,0,.5,-.25,0,0,.25,-.2]);
```
$$A := \begin{bmatrix} -.5 & 0 & 0 \\ .5 & -.25 & 0 \\ 0 & .25 & -.2 \end{bmatrix}$$
```
[ > eigenvects(A);
```
$[-.5, 1, \{[1, -2.000000000, 1.666666667]\}], [-.25, 1, \{[0, 1, -5.000000000]\}], [-.2, 1, \{[0, 0, 1]\}]$
```
[ > k:=evalm(inverse(A)&*vector([-20,0,0]));
```
$$k := [40.00000000, 80.00000000, 100.0000000]$$
```
[ > Phi0:=matrix(3,3,[3,0,0,-6,1,0,5,-5,1]);
```
$$\Phi 0 := \begin{bmatrix} 3 & 0 & 0 \\ -6 & 1 & 0 \\ 5 & -5 & 1 \end{bmatrix}$$
```
[ > c:=evalm(-inverse(Phi0)&*k);
```
$$c := [-13.33333333, -160.0000000, -833.3333333]$$

Work for example 4 page 372
```
[ > A:=matrix(2,2,[4,2,3,-1]);
```
$$A := \begin{bmatrix} 4 & 2 \\ 3 & -1 \end{bmatrix}$$
```
[ > x0:=vector([7,3]);
```
$$x0 := [7, 3]$$
```
[ > f:=t->evalm(-t*exp(-2*t)*vector([15,4]));
    #the inhomogeneous term.
```
$$f := t \rightarrow \text{evalm}(-t\, e^{(-2\,t)} [15, 4])$$
```
[ > sol:=t->evalm(exponential(A,t)&*(x0+
    int(exponential(-A,s)&*f(s),s=0..t)));
    #solution formula in Maple
```
$$sol := t \rightarrow \text{evalm}\left(\text{`\&*`}\left(\text{exponential}(A, t), x0 + \int_0^t \text{`\&*`}(\text{exponential}(-A, s), \text{f}(s))\, ds \right) \right)$$
```
[ > sol(t);
```

$$\left| \left[\left(\frac{1}{7} e^{(-2\,t)} + \frac{6}{7} e^{(5\,t)} \right) \left(7 - \frac{1}{14} \frac{-28\,t - 4 + 7\,t^2\,(e^t)^7 + 4\,(e^t)^7}{(e^t)^7} \right) \right. \right.$$

$$+ \left(\frac{2}{7} e^{(5\,t)} - \frac{2}{7} e^{(-2\,t)} \right) \left(3 + \frac{\dfrac{1}{14}(21\,t^2\,(e^t)^7 + 14\,t + 2 - 2\,(e^t)^7)}{(e^t)^7} \right),$$

$$\left(\frac{3}{7} e^{(5\,t)} - \frac{3}{7} e^{(-2\,t)} \right) \left(7 - \frac{1}{14} \frac{-28\,t - 4 + 7\,t^2\,(e^t)^7 + 4\,(e^t)^7}{(e^t)^7} \right)$$

$$\left. \left. + \left(\frac{6}{7} e^{(-2\,t)} + \frac{1}{7} e^{(5\,t)} \right) \left(3 + \frac{\dfrac{1}{14}(21\,t^2\,(e^t)^7 + 14\,t + 2 - 2\,(e^t)^7)}{(e^t)^7} \right) \right] \right]$$

```
> simplify(%);
  #this is the solution at the bottom of page 372
```

$$\left[\frac{3}{7} e^{(-2\,t)} - \frac{1}{2} e^{(-2\,t)}\,t^2 + \frac{46}{7} e^{(5\,t)} + 2\,e^{(-2\,t)}\,t, \ \frac{23}{7} e^{(5\,t)} + e^{(-2\,t)}\,t - \frac{2}{7} e^{(-2\,t)} + \frac{3}{2} e^{(-2\,t)}\,t^2 \right]$$

```
[ >
```