```
> with(LinearAlgebra):
> K :=
> Matrix([[-k1-k2,0,0,0],[+k1,0,0,0],[+k2,0,-k3,+k4],[0,0,+k3,-k4]]);
```

$$K := \begin{bmatrix} -k1 - k2 & 0 & 0 & 0 \\ k1 & 0 & 0 & 0 \\ k2 & 0 & -k3 & k4 \\ 0 & 0 & k3 & -k4 \end{bmatrix}$$

```
> E := Eigenvectors(K);
```

$$E := \begin{bmatrix} -k3 - k4 \\ 0 \\ 0 \\ -k1 - k2 \end{bmatrix}, \begin{bmatrix} 0 & 0 & 0 & \frac{(k1 + k2)\,(-k3 - k4 + k1 + k2)}{k3\,k2} \\ 0 & 0 & 1 & -\frac{k1\,(-k3 - k4 + k1 + k2)}{k3\,k2} \\ -1 & 1 & 0 & -\frac{k1 + k2 - k4}{k3} \\ 1 & \frac{k3}{k4} & 0 & 1 \end{bmatrix}$$

```
> v := E[1];
```

$$v := \begin{bmatrix} -k3 - k4 \\ 0 \\ 0 \\ -k1 - k2 \end{bmatrix}$$

```
> X := E[2];
```

$$X := \begin{bmatrix} 0 & 0 & 0 & \frac{(k1 + k2)\,(-k3 - k4 + k1 + k2)}{k3\,k2} \\ 0 & 0 & 1 & -\frac{k1\,(-k3 - k4 + k1 + k2)}{k3\,k2} \\ -1 & 1 & 0 & -\frac{k1 + k2 - k4}{k3} \\ 1 & \frac{k3}{k4} & 0 & 1 \end{bmatrix}$$

```
> L :=
> DiagonalMatrix([exp(v[1]*t),exp(v[2]*t),exp(v[3]*t),exp(v[4]*t)]);
```

$$L := \begin{bmatrix} e^{((-k3-k4)\,t)} & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & e^{((-k1-k2)\,t)} \end{bmatrix}$$

```
> c0 := Vector ([Ao,0,0,0]);
```

$$c0 := \begin{bmatrix} Ao \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

```
> ct := X . L . MatrixInverse(X) . c0;
```

$$ct :=$$
$$\left[e^{((-k1-k2)\,t)}\ Ao\right]$$
$$\left[\left(\frac{k1}{k1+k2}-\frac{k1\ e^{((-k1-k2)\,t)}}{k1+k2}\right)Ao\right]$$
$$\left[\left(\frac{e^{((-k3-k4)\,t)}\ k3\ k2}{(-k3-k4+k1+k2)\,(k3+k4)}+\frac{k2\ k4}{(k1+k2)\,(k3+k4)}\right.\right.$$
$$\left.\left.-\frac{(k1+k2-k4)\,e^{((-k1-k2)\,t)}\ k2}{(k1+k2)\,(-k3-k4+k1+k2)}\right)Ao\right]$$
$$\left[\left(-\frac{e^{((-k3-k4)\,t)}\ k3\ k2}{(-k3-k4+k1+k2)\,(k3+k4)}+\frac{k3\ k2}{(k1+k2)\,(k3+k4)}\right.\right.$$
$$\left.\left.+\frac{e^{((-k1-k2)\,t)}\ k3\ k2}{(k1+k2)\,(-k3-k4+k1+k2)}\right)Ao\right]$$

```
> ctA := ct[1];
```

$$ctA := e^{((-k1-k2)\,t)}\ Ao$$

```
> ctB := ct[2];
```

$$ctB := \left(\frac{k1}{k1+k2}-\frac{k1\ e^{((-k1-k2)\,t)}}{k1+k2}\right)Ao$$

```
> ctC := ct[3];
```

$$ctC := \left(\frac{e^{((-k3-k4)\,t)}\ k3\ k2}{(-k3-k4+k1+k2)\,(k3+k4)}+\frac{k2\ k4}{(k1+k2)\,(k3+k4)}\right.$$
$$\left.-\frac{(k1+k2-k4)\,e^{((-k1-k2)\,t)}\ k2}{(k1+k2)\,(-k3-k4+k1+k2)}\right)Ao$$

```
> ctD := ct[4];
```

$$ctD := \left(-\frac{e^{((-k3-k4)\,t)}\ k3\ k2}{(-k3-k4+k1+k2)\,(k3+k4)}+\frac{k3\ k2}{(k1+k2)\,(k3+k4)}\right.$$
$$\left.+\frac{e^{((-k1-k2)\,t)}\ k3\ k2}{(k1+k2)\,(-k3-k4+k1+k2)}\right)Ao$$