```
> dsolve(diff(y(x),x,x)+y(x));
```

$$y(x) = \_C1 \cos(x) + \_C2 \sin(x)$$

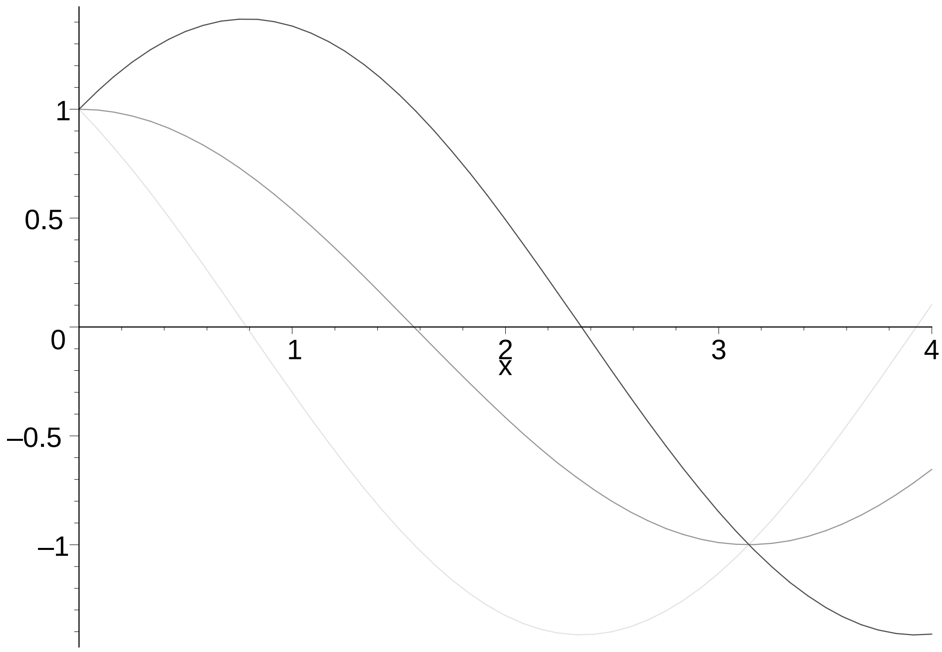
```
> ode:=dsolve({diff(diff(y(x),x),x)+y(x),y(0)=alpha,D(y)(0)=beta});
```

$$ode := y(x) = \alpha \cos(x) + \beta \sin(x)$$

```
> sol:=rhs(ode);
```

$$sol := \alpha \cos(x) + \beta \sin(x)$$

```
> plot({
  subs({alpha=1,beta=1},sol),subs({alpha=1,beta=0},sol),subs({alpha=
  1,beta=-1},sol)},x=0..4);
```




```
> A:=evalm([[0,-1],[1,0]]);
```

$$A := \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$$

```
> dsolve(diff(y(x),x)=A * y(x));
```

$$y(x) = \_C1\, \mathbf{e}^{(A\,x)}$$

```
> exponential(A,t);
```

$$\begin{bmatrix} \cos(t) & -\sin(t) \\ \sin(t) & \cos(t) \end{bmatrix}$$

```
> eigenvals(A); eigenvectors(A);
```

$$I, -I$$

$$[I, 1, \{[1, -I]\}], [-I, 1, \{[1, I]\}]$$

```
> C:=evalm([[I, -I],[1, 1]]);
```

$$C := \begin{bmatrix} I & -I \\ 1 & 1 \end{bmatrix}$$

```
> d:=evalm(1/C &* A &* C);
```

$$d := \begin{bmatrix} I & 0 \\ 0 & -I \end{bmatrix}$$

```
> map(simplify,evalm(C &* exponential(d,t) / C));
```

$$\begin{bmatrix} \cos(t) & -\sin(t) \\ \sin(t) & \cos(t) \end{bmatrix}$$

```
> y(x) = evalm(exponential(A,t) &* [alpha,beta]);
```

$$\mathrm{y}(x) = [\cos(t)\,\alpha - \sin(t)\,\beta,\ \sin(t)\,\alpha + \cos(t)\,\beta]$$