```
A = [-1 0 8; 0 -2 0; 0 0 -3]
```

```
A = 3×3
    -1     0     8
     0    -2     0
     0     0    -3
```

```
B = [0 2; 3 0; 0 0]
```

```
B = 3×2
     0     2
     3     0
     0     0
```

```
C = [1 0 -1]
```

```
C = 1×3
     1     0    -1
```

```
D = [0 0]
```

```
D = 1×2
     0     0
```

```
[M, L] = eig(A)
```

```
M = 3×3
    1.0000         0   -0.9701
         0    1.0000         0
         0         0    0.2425
L = 3×3
    -1     0     0
     0    -2     0
     0     0    -3
```

```
syms t
Phi_p = @(t) diag(exp(diag(L) * t));
Phi_p(t)
```

```
ans =
```

$$\begin{pmatrix} \mathrm{e}^{-t} & 0 & 0 \\ 0 & \mathrm{e}^{-2t} & 0 \\ 0 & 0 & \mathrm{e}^{-3t} \end{pmatrix}$$

```
M_inv = inv(M);
Phi = @(t) M * Phi_p(t) * M_inv;
Phi(t)
```

```
ans =
```

$$\begin{pmatrix} \mathrm{e}^{-t} & 0 & 4\,\mathrm{e}^{-t} - 4\,\mathrm{e}^{-3t} \\ 0 & \mathrm{e}^{-2t} & 0 \\ 0 & 0 & \mathrm{e}^{-3t} \end{pmatrix}$$

```
u = @(t) [4; sin(2 * pi * t)];
u(t)
```

ans =

$$\begin{pmatrix} 4 \\ \sin(2\,\pi\,t) \end{pmatrix}$$

```
syms T
x_fo = @(t) int(Phi(t - T) * B * u(T), T, 0, t);
x_fo(t)
```

ans =

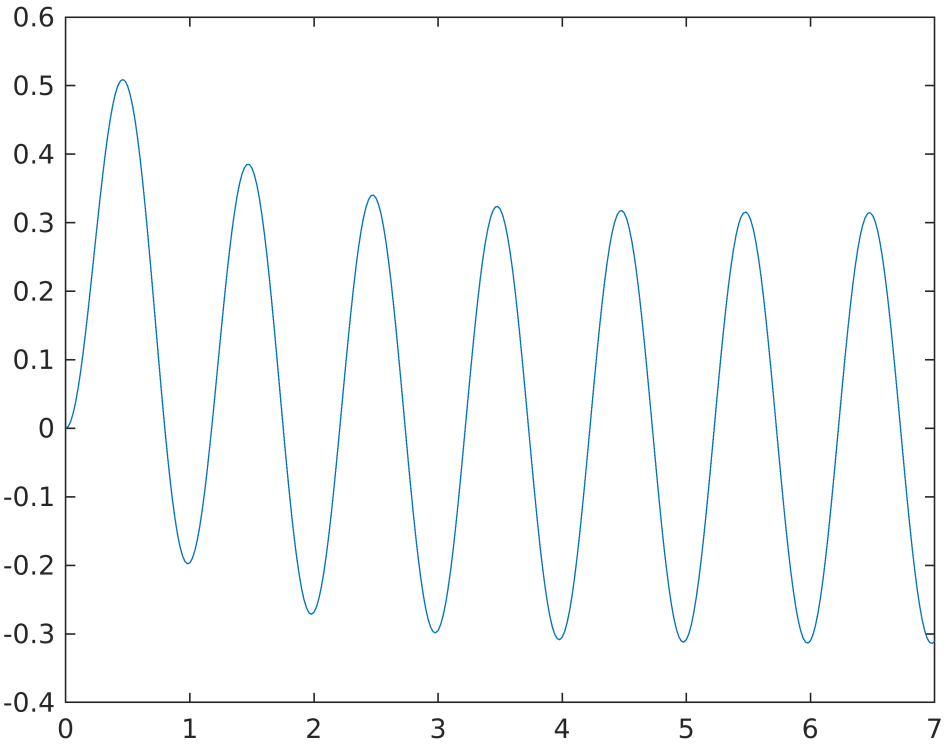
$$\begin{pmatrix} \frac{2\,(\sin(2\,\pi\,t) - 2\,\pi\cos(2\,\pi\,t))}{4\,\pi^2+1} + \frac{4\,\pi\,\mathrm{e}^{-t}}{4\,\pi^2+1} \\ 6 - 6\,\mathrm{e}^{-2\,t} \\ 0 \end{pmatrix}$$

```
y_fo = @(t) C * x_fo(t) + D * u(t);
y_fo(t)
```

ans =

$$\frac{2\,(\sin(2\,\pi\,t) - 2\,\pi\cos(2\,\pi\,t))}{4\,\pi^2+1} + \frac{4\,\pi\,\mathrm{e}^{-t}}{4\,\pi^2+1}$$

```
t_vec = 0:0.02:7;
y_fun = matlabFunction(y_fo(t));
plot(t_vec, y_fun(t_vec))
```


0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
0
1
2
3
4
5
6
7