# Señales y sistemas

## Handles vs Symbolic

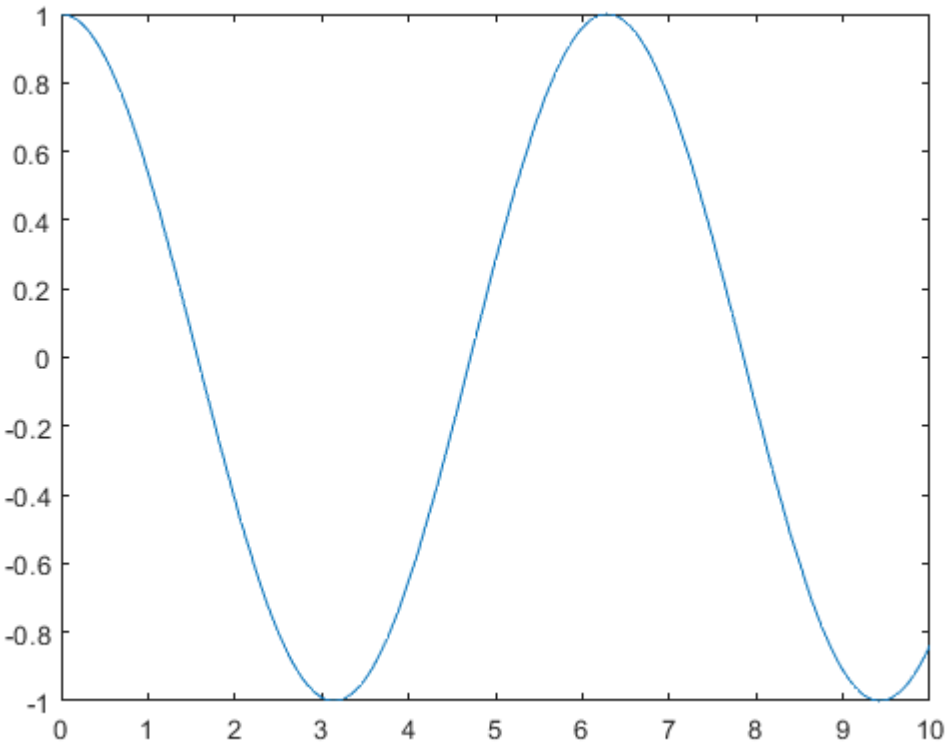
```
syms t

%Variable simbólica
y_symb=cos(t)
```

```
y_symb = cos(t)
```

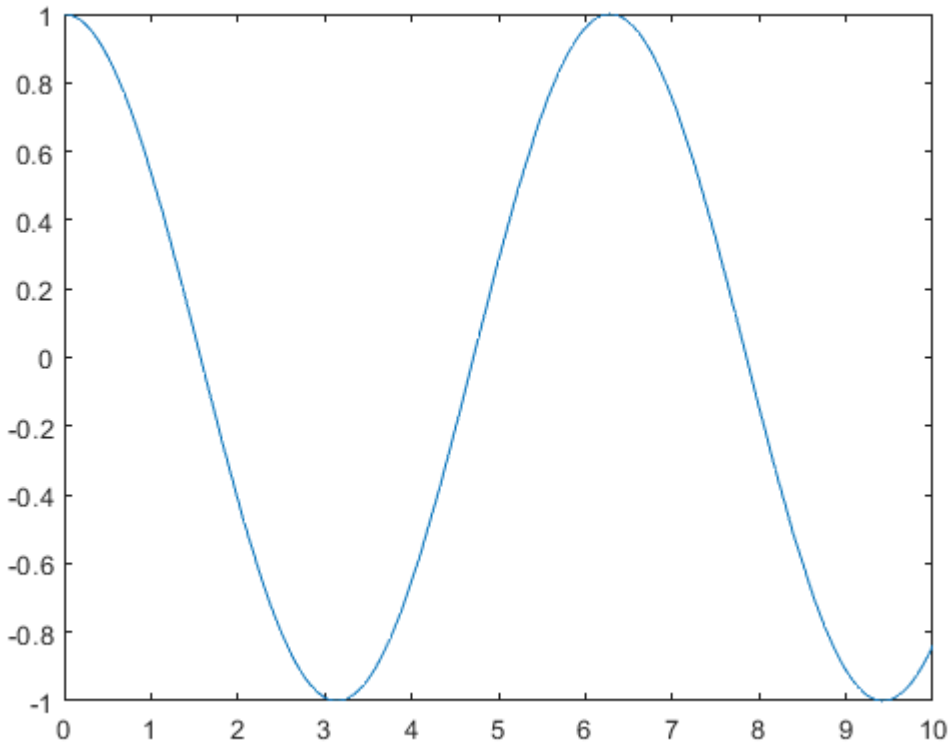
```
%Function handle
y_fh= @(t) cos(t)
```

```
y_fh = function_handle with value:
    @(t)cos(t)
```

```
%f plot es para funciones simbólicas y también para "fuction handles"
figure
fplot(y_symb,[0 10])
```




```
figure
fplot(y_fh,[0 10])
```




```
%Diferencia entre variables simbólicas y function handles
y_fh([5 8 10]) %Se evaluan directamente
```

```
ans = 1×3
    0.2837   -0.1455   -0.8391
```

```
%y_symb([5 8 10]) %ERROR: NO se evaluan directamente
subs(y_symb,t,[5 8 10])
```

ans = $(\cos(5) \quad \cos(8) \quad \cos(10))$

```
%Se puede hacer algebra con variables simbolicas
y_3=y_symb+sin(t)+exp(-t)
```

y_3 = $\mathrm{e}^{-t} + \cos(t) + \sin(t)$

```
diff(y_3)
```

ans = $\cos(t) - \mathrm{e}^{-t} - \sin(t)$

```
int(y_3,[0 1])
```

ans = $\sin(1) - \mathrm{e}^{-1} - \cos(1) + 2$

```
int(y_3,t)
```

```
ans =
```

$$-e^{-t} - \sqrt{2}\cos\left(t + \frac{\pi}{4}\right)$$

```
%y_fh+y_fh %ERROR: no se pueden hacer operaciones con fucntion handles
y_3_fh=matlabFunction(y_3)
```

```
y_3_fh = function_handle with value:
    @(t)exp(-t)+cos(t)+sin(t)
```

```
y_3_fh([5 8 10])
```

```
ans = 1×3
   -0.6685    0.8442   -1.3830
```

## Funciones Continuas vs Discretas

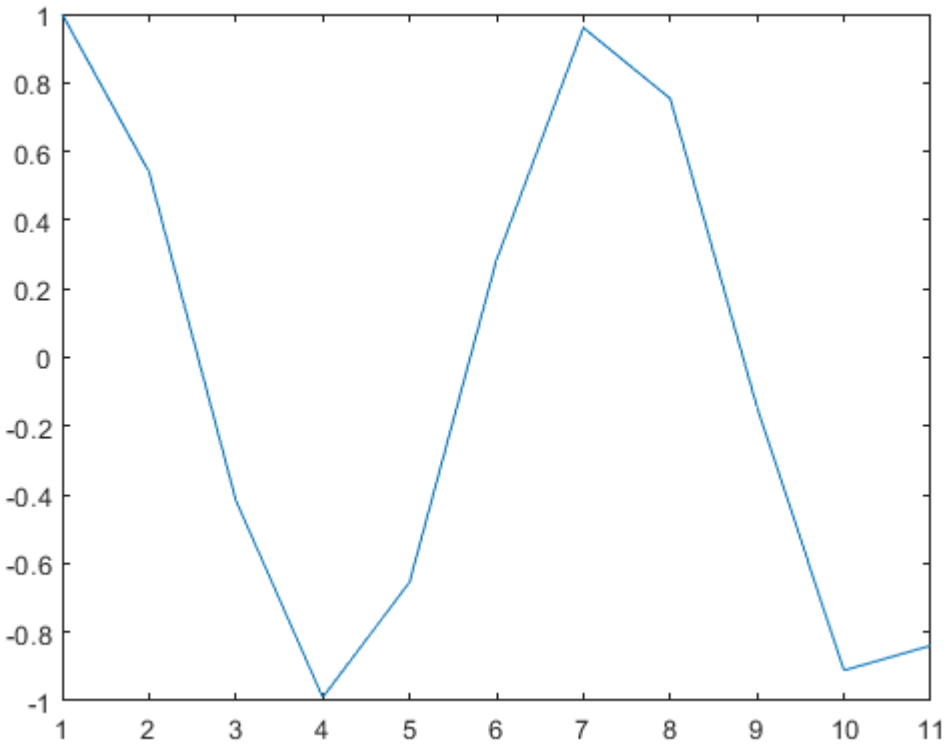
```
t_disc=0:10
```

```
t_disc = 1×11
     0     1     2     3     4     5     6     7     8     9    10
```

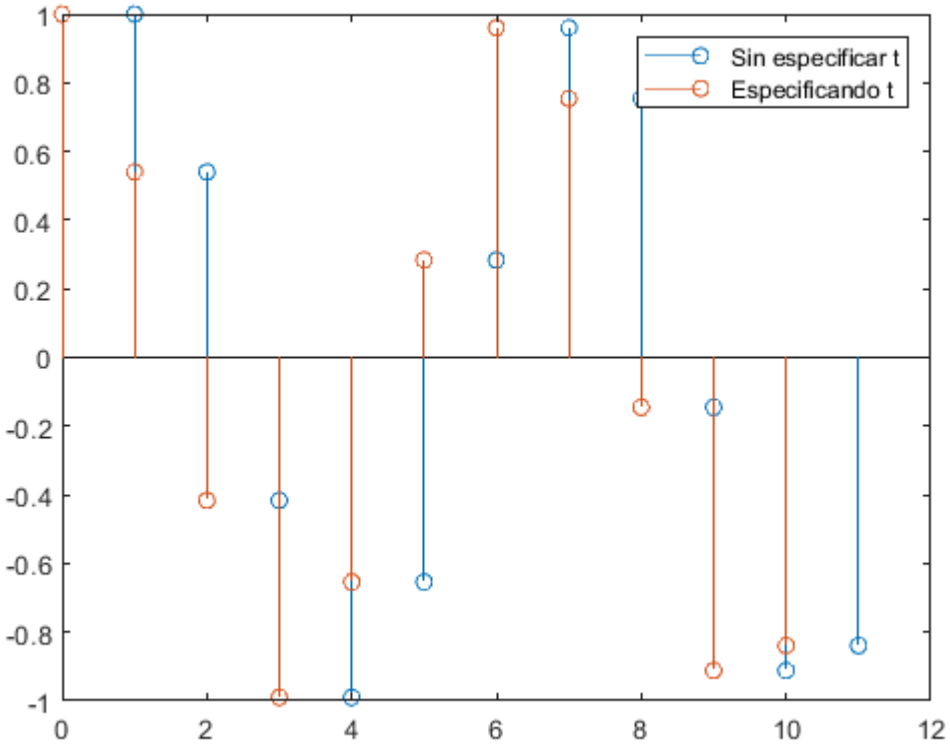
```
t_disc=0:10;

y_disc=y_fh(t_disc)
```

```
y_disc = 1×11
    1.0000    0.5403   -0.4161   -0.9900   -0.6536    0.2837    0.9602    0.7539 ···
```

```
figure
%plot es para muestras/vectores
plot(y_disc)
```




```
figure
stem(y_disc)
hold on
%figure
%stem es para muestras/vectores
stem(t_disc,y_disc)
hold off
legend("Sin especificar t","Especificando t")
```



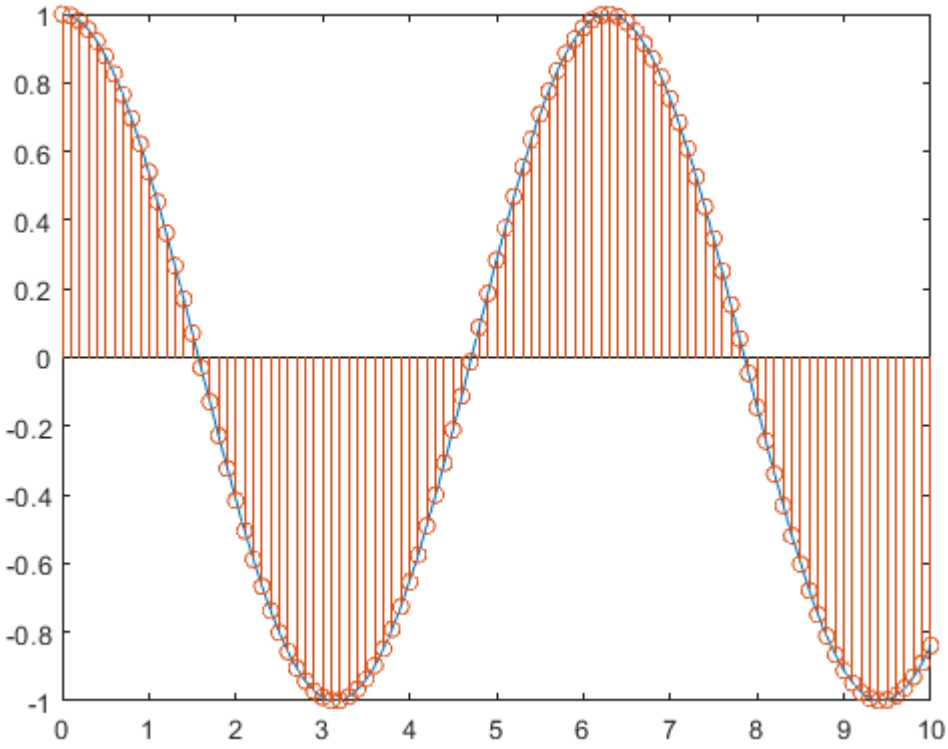

```
t_disc=0:0.1:10
```

```
t_disc = 1×101
         0    0.1000    0.2000    0.3000    0.4000    0.5000    0.6000    0.7000 ···
```

```
y_disc=y_fh(t_disc)
```

```
y_disc = 1×101
    1.0000    0.9950    0.9801    0.9553    0.9211    0.8776    0.8253    0.7648 ···
```

```
figure
fplot(y_fh,[0 10])
hold on
stem(t_disc,y_disc)
hold off
```




## Ejercicio 1

```
x=3*exp(0.4*t)
```

x =

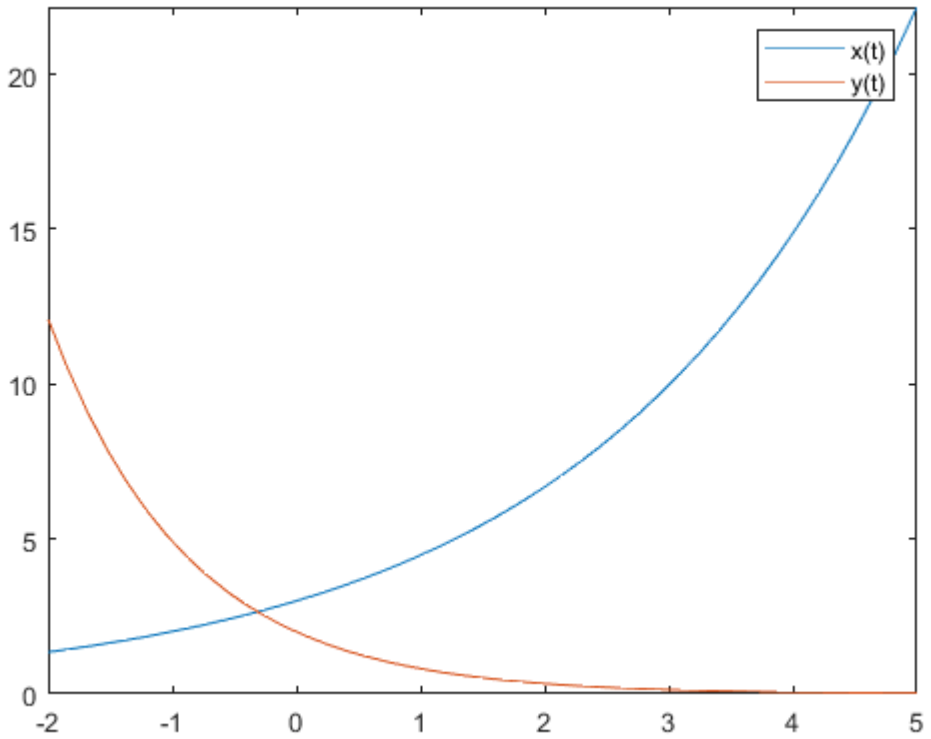
$$3\,e^{\frac{2t}{5}}$$

```
y=2*exp(-0.9*t)
```

y =

$$2\,e^{-\frac{9t}{10}}$$

```
figure
fplot(x,[-2,5])
hold on
fplot(y,[-2,5])
legend("x(t)","y(t)")
hold off
```




## Ejercicio 2

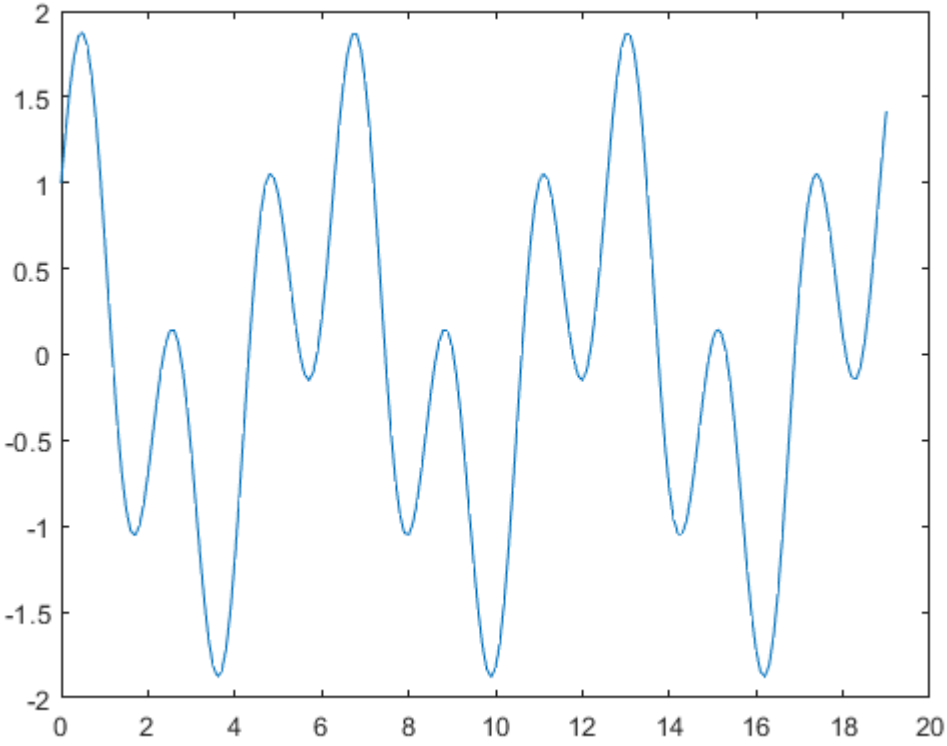
```
t_1=0:0.1:19
```

```
t_1 = 1×191
         0    0.1000    0.2000    0.3000    0.4000    0.5000    0.6000    0.7000 ···
```

```
x_t=cos(t_1)+sin(3*t_1)
```

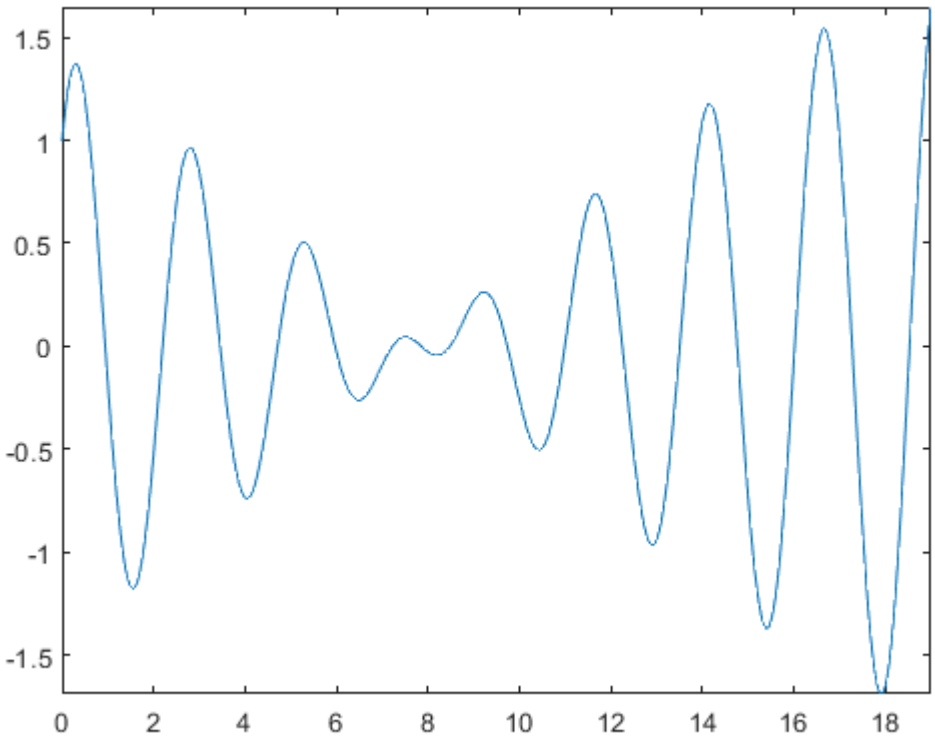
```
x_t = 1×191
    1.0000    1.2905    1.5447    1.7387    1.8531    1.8751    1.7992    1.6281 ···
```

```
plot(t_1,x_t)
```



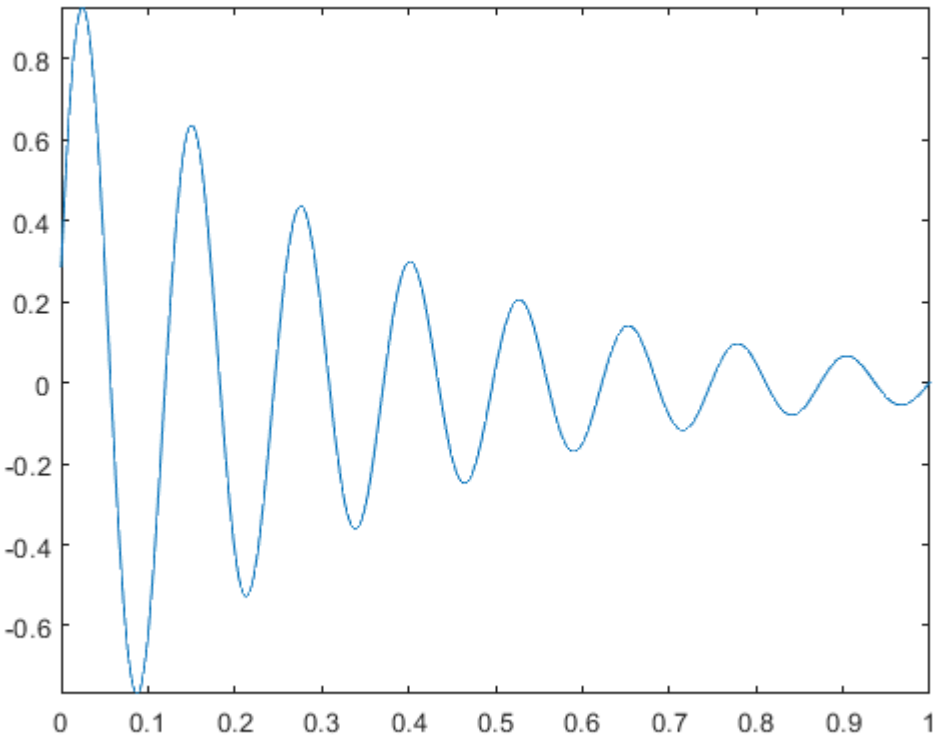

## Formas de onda básicas

```
syms t
a=2.6;
b=2.4;
t0=25.5;
tf=91.3;
x(t)=cos(a*t)+sin(b*t);

figure
fplot(x,[0 19])
```




## Ejercicio 3

```
syms t
t0=0;
tf=1;
theta=5;
omega=50;
C=1;
r=-3;
figure
x_1=C*exp(r*t)*cos(omega*t+theta);
fplot(x_1,[t0 tf])
```

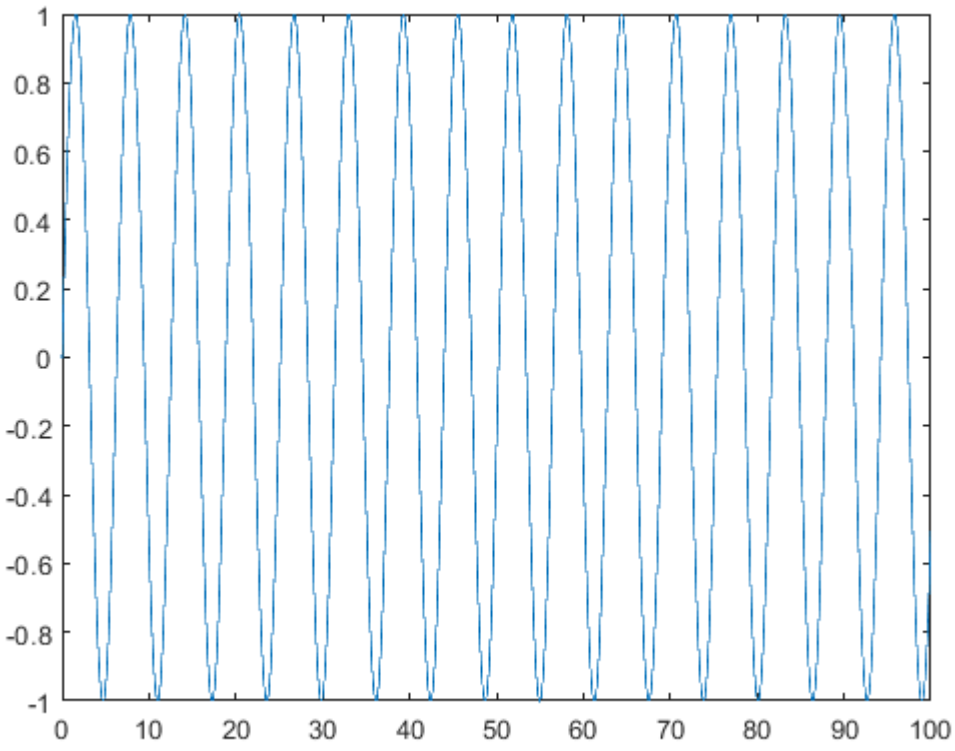



## Gráfica de la función seno

```
t=0:0.01:100;
x_t=sin(t)
```

```
x_t = 1×10001
         0    0.0100    0.0200    0.0300    0.0400    0.0500    0.0600    0.0699 ···
```

```
plot(t,x_t)
```

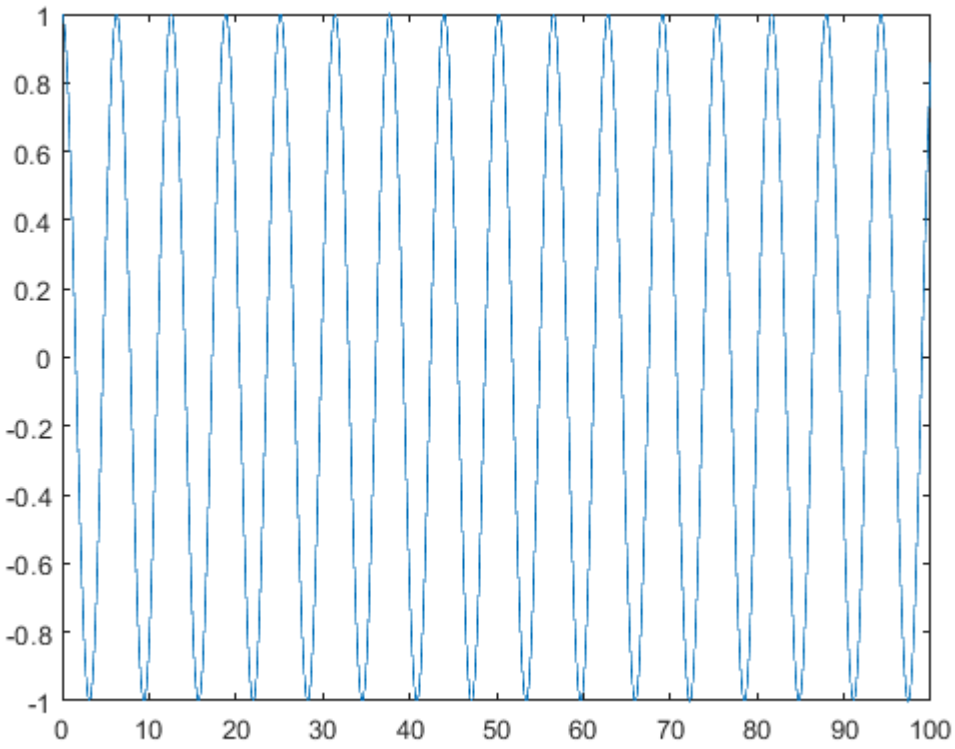



## Gráfica de la función coseno

```
t=0:0.01:100;
x_t=cos(t)
```

```
x_t = 1×10001
    1.0000    1.0000    0.9998    0.9996    0.9992    0.9988    0.9982    0.9976 ···
```

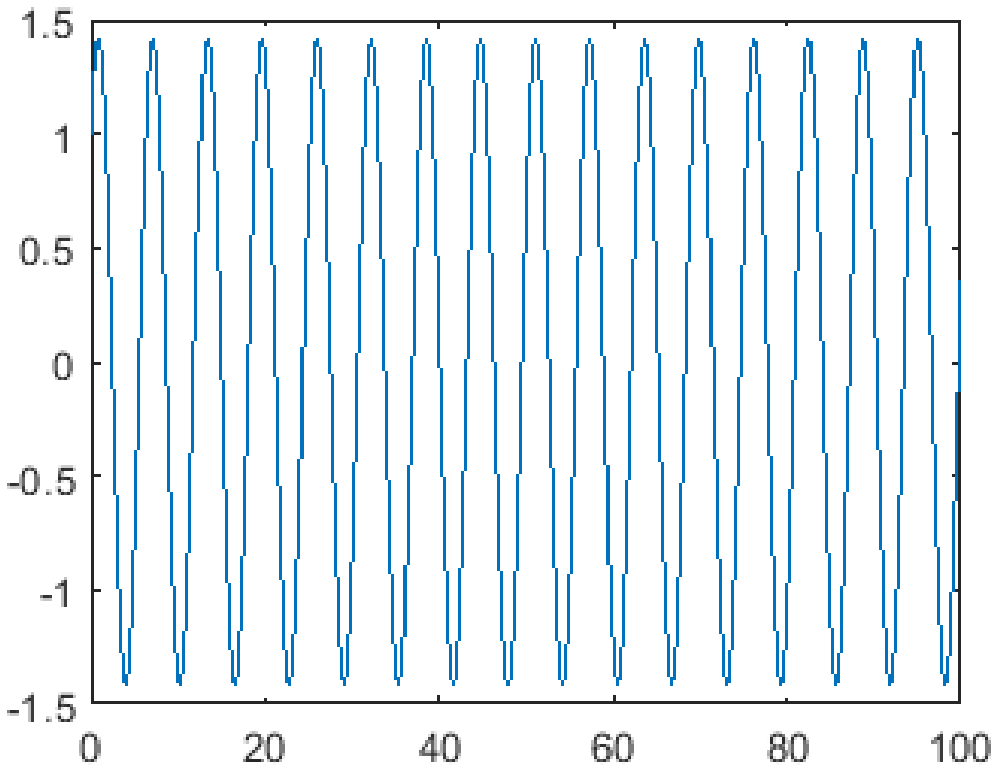
```
plot(t,x_t)
```




```
% GRÁFICA SENO MAS COSENO

t=0:0.01:100;
x_t=cos(t) + sin(t)
```

```
x_t = 1×10001
    1.0000    1.0099    1.0198    1.0295    1.0392    1.0487    1.0582    1.0675 ···
```

```
figure
plot(t,x_t)
```


1.5
1
0.5
0
-0.5
-1
-1.5
0
20
40
60
80
100