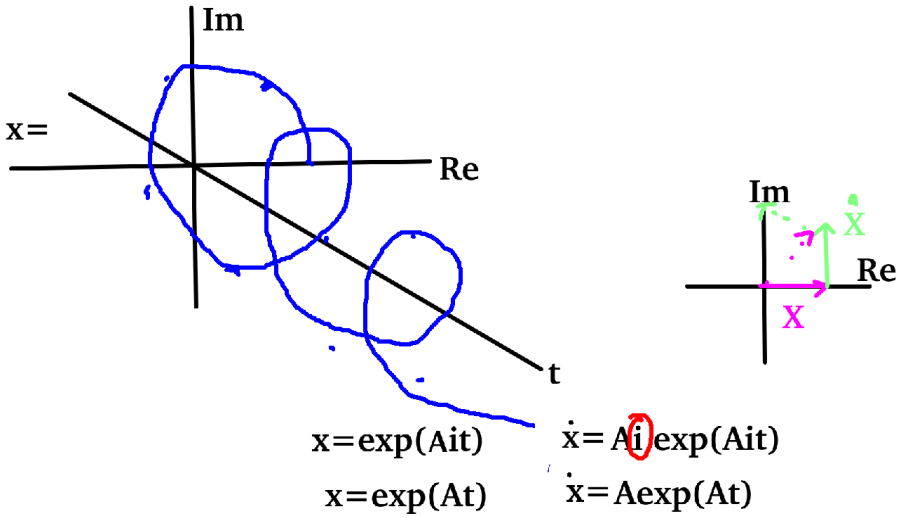
Series de fourier

Visualizar exponenciales complejas




```
syms t
A=1;
x=exp(1i*t*A)
```

x = $e^{t\,i}$

```
x_Re=real(x)
```

x_Re = $\mathrm{real}(e^{t\,i})$

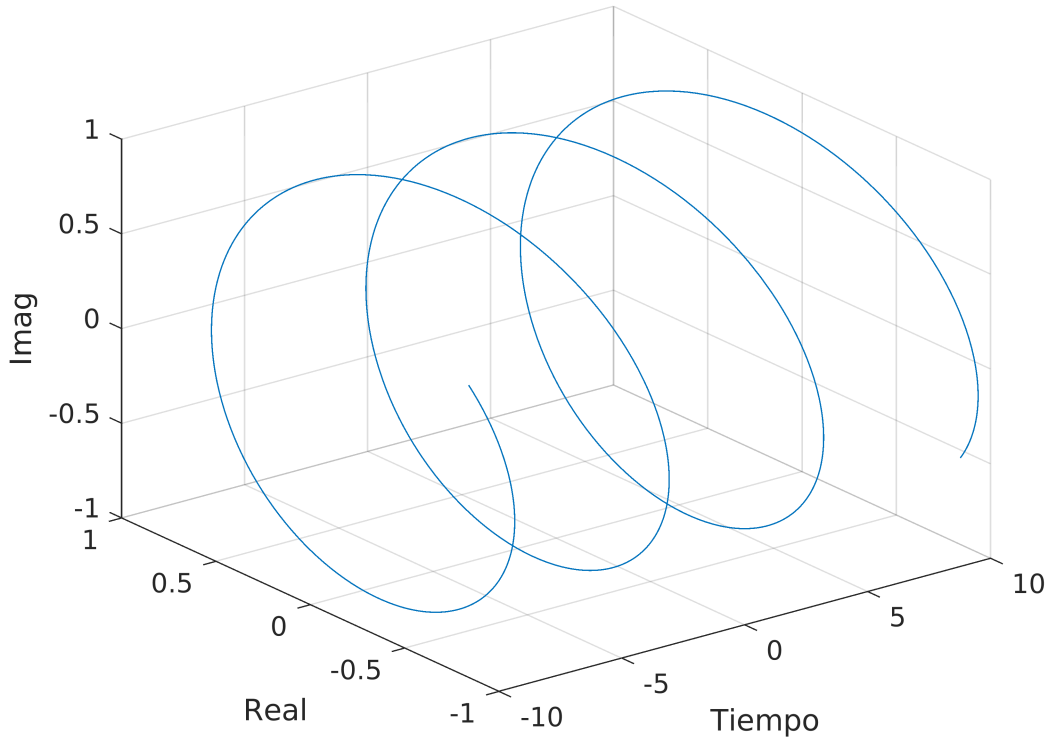
```
x_Im=imag(x)
```

x_Im = $\mathrm{imag}(e^{t\,i})$

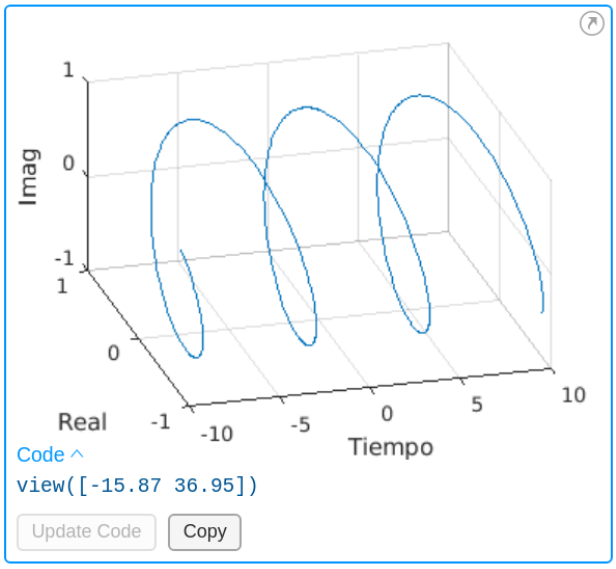
```
fplot3(t,x_Re,x_Im,[-10  10])
```

```
Warning: MATLAB has disabled some advanced graphics rendering features by switching to software
OpenGL. For more information, click here.
```

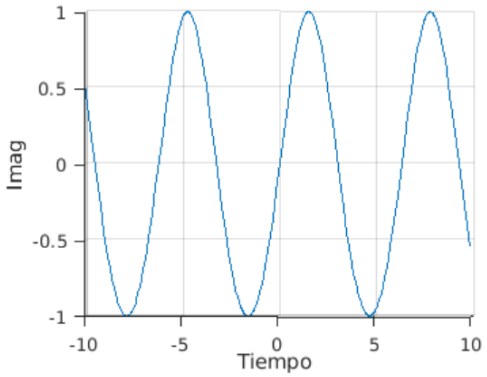
```
ylabel("Real")
zlabel("Imag")
xlabel("Tiempo")
```



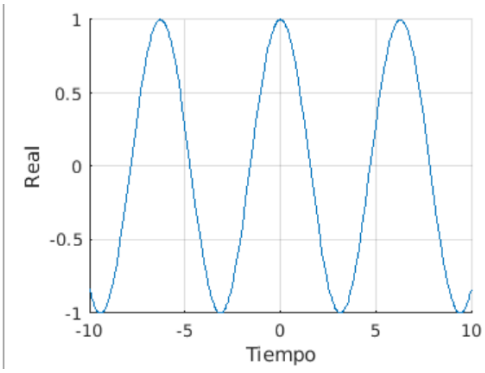
Exponencial compleja



La parte imaginaria se parece a: Seno



La parte real se parece a: Coseno



Calcular la parte real ($cos(t)$) e imaginaria $sin(t)$ de la función:

$$x = e^{Ait}$$

Usar las fórmulas para calcular la parte real e imaginaria de un número complejo.

```
x_1=exp(1i*t)
```

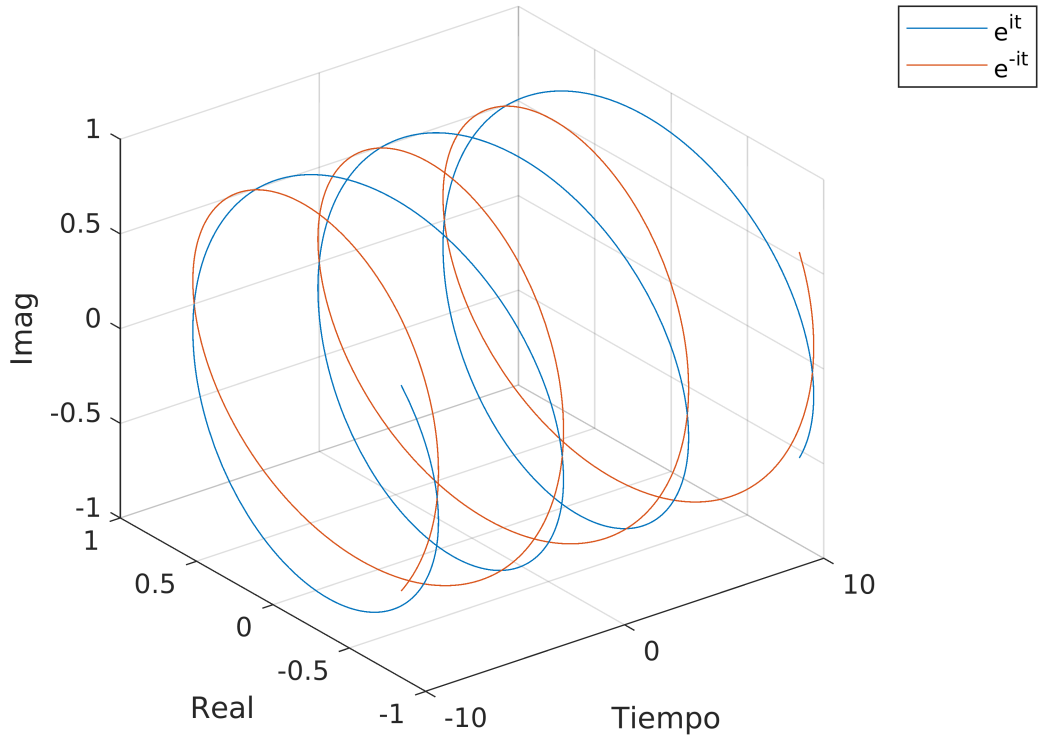
x_1 = $e^{t\,i}$

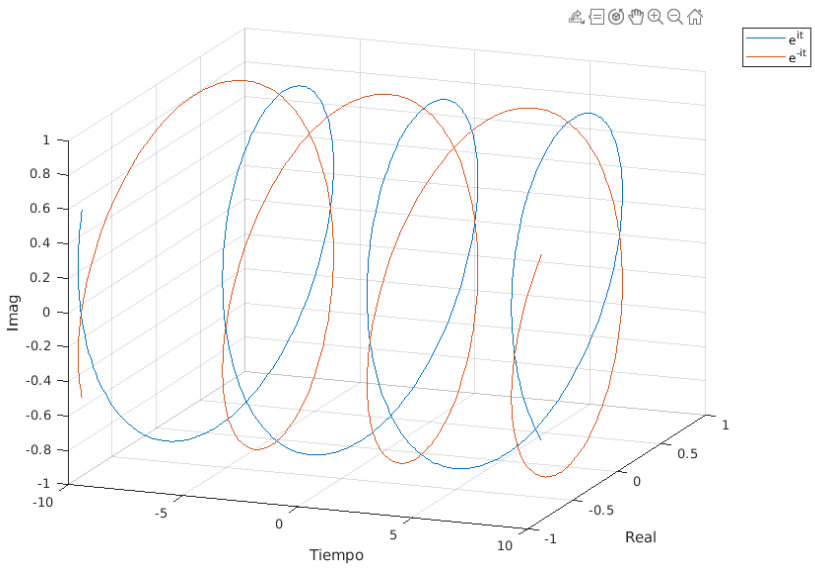
```
x_2=exp(-1i*t)
```

x_2 = $e^{-t\,i}$

```
x_Re=real(x_1);
x_Im=imag(x_1);

figure
fplot3(t,x_Re,x_Im,[-10  10])
hold on

x_Re=real(x_2);
x_Im=imag(x_2);

fplot3(t,x_Re,x_Im,[-10  10])
hold off
```

```
ylabel("Real")
zlabel("Imag")
xlabel("Tiempo")
legend("e^{it}","e^{-it}")
```

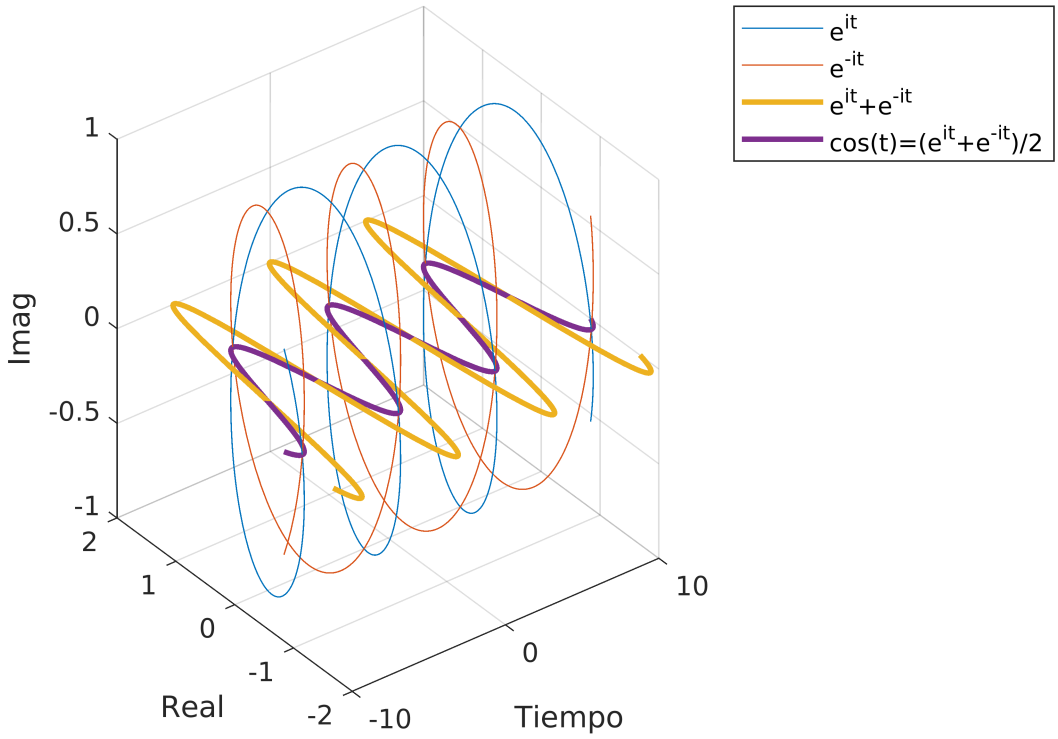


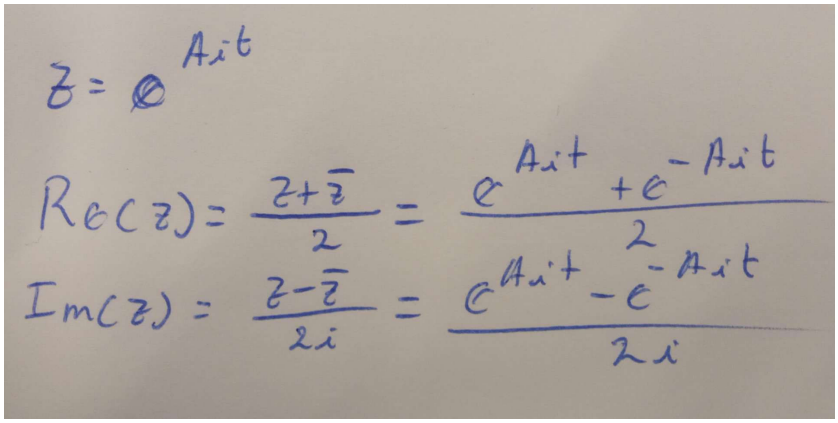


Frecuencia positiva: Contrario a las manecillas del reloj

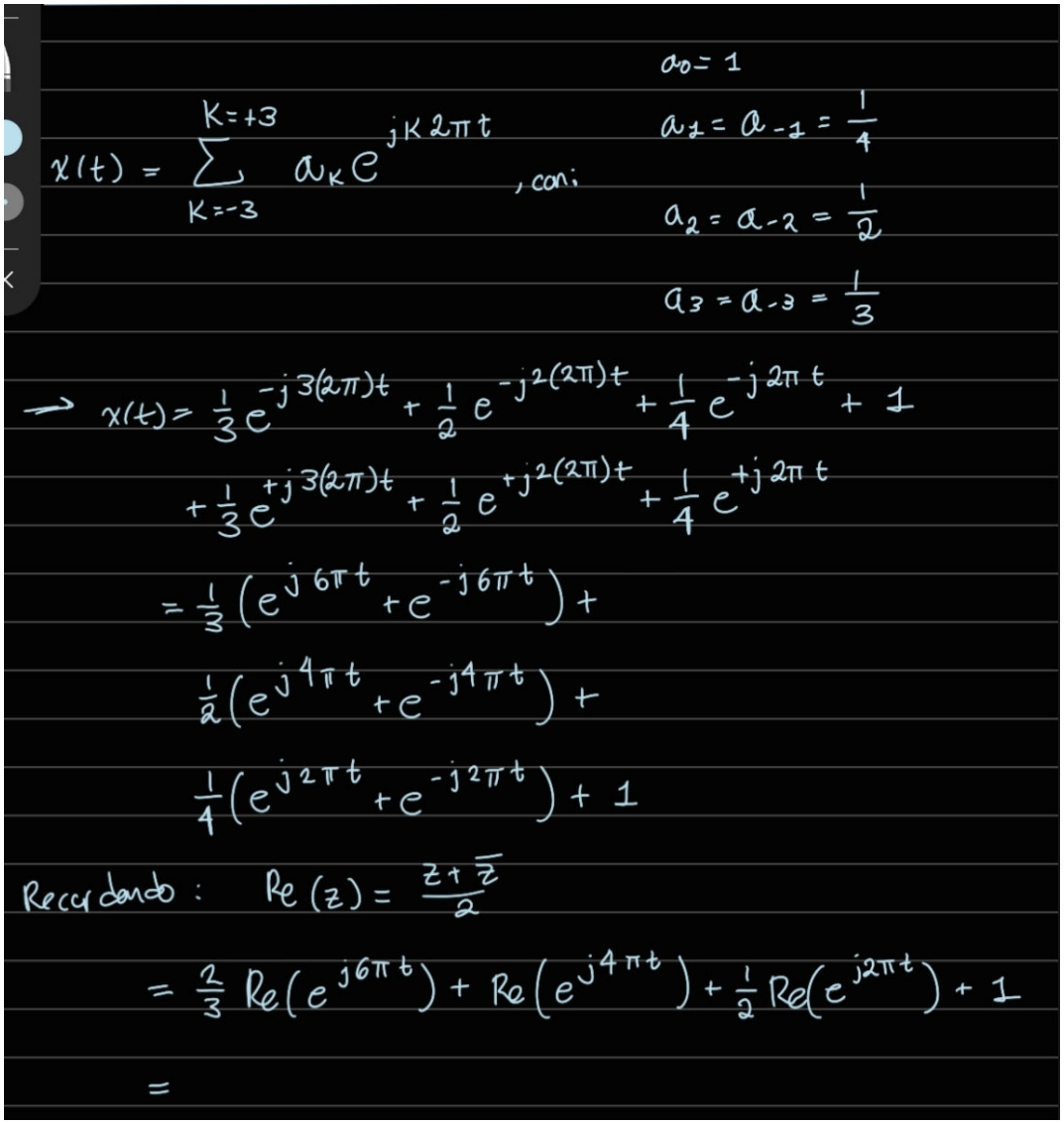
Frecuencia negativa: Sentido de las manecillas del reloj

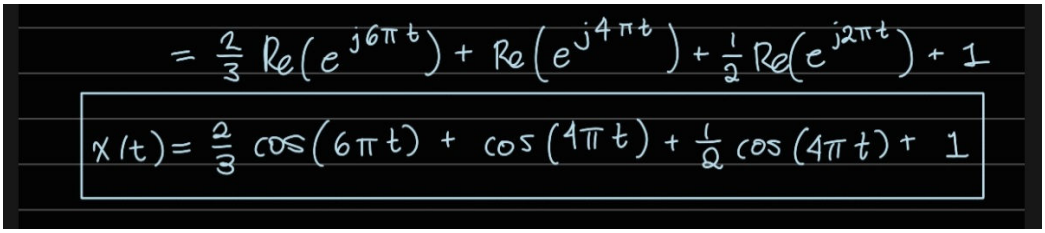
```
x_Re=real(x_1);
x_Im=imag(x_1);

figure
fplot3(t,x_Re,x_Im,[-10  10])
hold on

x_Re=real(x_2);
x_Im=imag(x_2);

fplot3(t,x_Re,x_Im,[-10  10])

x_Re=real(x_1);
x_Im=imag(x_1);
fplot(t,x_1+x_2,[-10  10],'LineWidth',2)
fplot(t,(x_1+x_2)/2,[-10  10],'LineWidth',2)
hold off

ylabel("Real")
zlabel("Imag")
xlabel("Tiempo")
legend("e^{it}","e^{-it}","e^{it}+e^{-it}","cos(t)=(e^{it}+e^{-it})/2 ")
```




$z = e^{A_i t}$
$Re(z) = \frac{z+\bar{z}}{2} = \frac{e^{A_i t} + e^{-A_i t}}{2}$
$Im(z) = \frac{z-\bar{z}}{2i} = \frac{e^{A_i t} - e^{-A_i t}}{2i}$

Series


$x(t) = \sum_{K=-3}^{K=+3} a_K e^{jK2\pi t}$, con:
$a_0 = 1$
$a_1 = a_{-1} = \frac{1}{4}$
$a_2 = a_{-2} = \frac{1}{2}$
$a_3 = a_{-3} = \frac{1}{3}$
$\rightarrow x(t) = \frac{1}{3}e^{-j3(2\pi)t} + \frac{1}{2}e^{-j2(2\pi)t} + \frac{1}{4}e^{-j2\pi t} + 1$
$+ \frac{1}{3}e^{+j3(2\pi)t} + \frac{1}{2}e^{+j2(2\pi)t} + \frac{1}{4}e^{+j2\pi t}$
$= \frac{1}{3}(e^{j6\pi t} + e^{-j6\pi t}) +$
$\frac{1}{2}(e^{j4\pi t} + e^{-j4\pi t}) +$
$\frac{1}{4}(e^{j2\pi t} + e^{-j2\pi t}) + 1$
Recordando: $Re(z) = \frac{z+\bar{z}}{2}$
$= \frac{2}{3}Re(e^{j6\pi t}) + Re(e^{j4\pi t}) + \frac{1}{2}Re(e^{j2\pi t}) + 1$
$=$



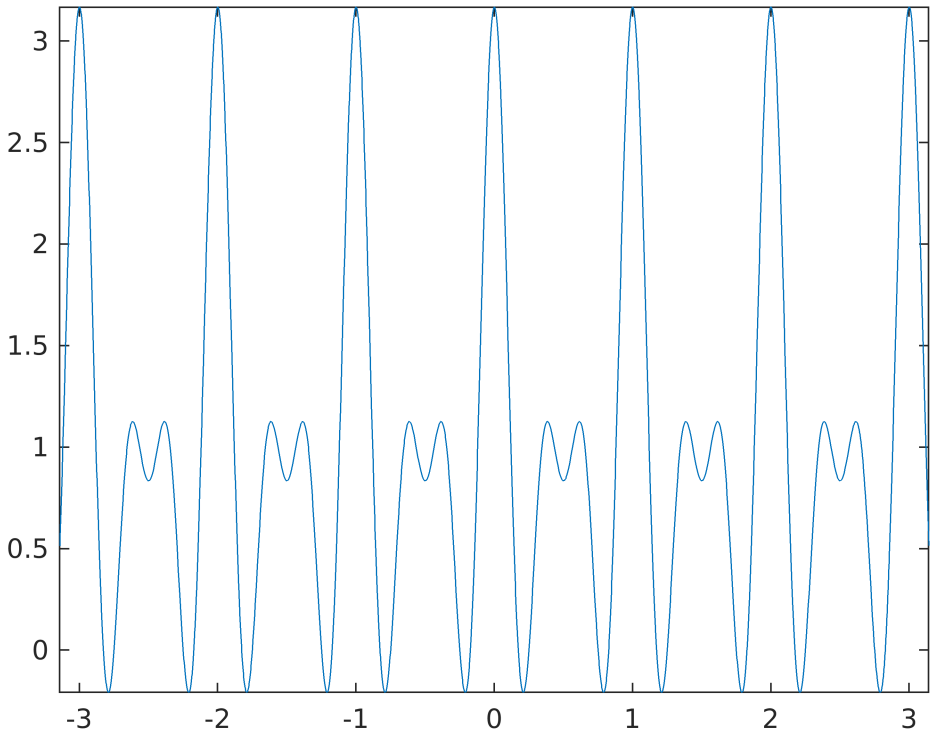
Propiedad de : Axel Chávez

```
syms t
x=1+(1/2)*cos(2*pi*t)+cos(4*pi*t)+(2/3)*cos(6*pi*t)
```

```
x =
```

$$\frac{\cos(2\,\pi\,t)}{2} + \cos(4\,\pi\,t) + \frac{2\cos(6\,\pi\,t)}{3} + 1$$

```
figure
fplot(x,[-pi pi])
```



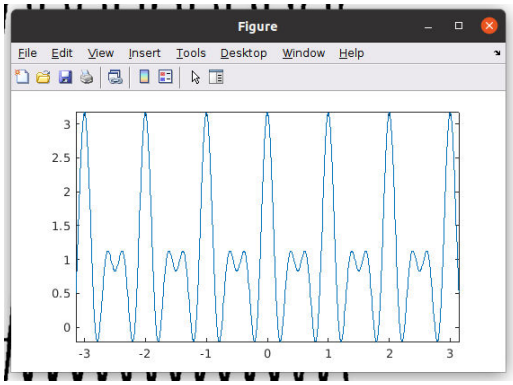
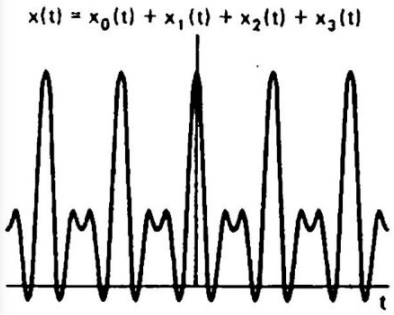


Figure
File Edit View Insert Tools Desktop Window Help
3
2.5
2
1.5
1
0.5
0
-3 -2 -1 0 1 2 3


x(t) = x0(t) + x1(t) + x2(t) + x3(t)
t