Módulo V: Álgebra Lineal

- Manipulación de matrices.
- Solución de ecuaciones lineales.
- Valores y vectores propios.
- Funciones elementales.
- Gráficas básicas.

```
A = [1, 2; 3, 0]
```

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

```
B = [3, -8; 0, 5]
```

```
B = 2×2
     3    -8
     0     5
```

```
A + B
```

```
ans = 2×2
     4    -6
     3     5
```

```
A*B
```

```
ans = 2×2
     3     2
     9   -24
```

```
B*A
```

```
ans = 2×2
   -21     6
    15     0
```

```
A.*B
```

```
ans = 2×2
     3   -16
     0     0
```

```
B.*A
```

```
ans = 2×2
     3   -16
```

```
     0     0
```

```
A^2
```

```
ans = 2×2
     7     2
     3     6
```

```
A*A
```

```
ans = 2×2
     7     2
     3     6
```

```
A.^2
```

```
ans = 2×2
     1     4
     9     0
```

```
A
```

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

```
AT = A'
```

```
AT = 2×2
     1     3
     2     0
```

```
A/B
```

```
ans = 2×2
    0.3333    0.9333
    1.0000    1.6000
```

```
A*inv(B)
```

```
ans = 2×2
    0.3333    0.9333
    1.0000    1.6000
```

```
A\B
```

```
ans = 2×2
         0    1.6667
    1.5000   -4.8333
```

```
inv(A)*B
```

```
ans = 2×2
         0    1.6667
    1.5000   -4.8333
```

Solución de ecuaciones lineales

Solucionar el sistema de ecuaciones lineales:

$$Ax = b$$

$$3x - 10y + z = 1$$
$$4w + x - 2z = 3$$
$$2w - x + \frac{1}{3}y = 14$$
$$5w + 3z = 0$$

Solución:

$$x = A^{-1}B$$

```
A = [ 0, 3, -10, 1;
    4, 1, 0, -2;
    2, -1, (1/3), 0;
    5, 0, 0, 3 ]
```

```
A = 4×4
         0    3.0000  -10.0000    1.0000
    4.0000    1.0000         0   -2.0000
    2.0000   -1.0000    0.3333         0
    5.0000         0         0    3.0000
```

```
B = [1; 3; 14; 0]
```

```
B = 4×1
     1
     3
    14
     0
```

```
x = inv( A )*B
```

```
x = 4×1
    1.9584
  -11.3615
```

```
    -3.8349
    -3.2640
```

```
R = [1, 2, 0.5;
     0.0, 3.2, 4.0;
     2, 5.1, 0.8]
```

```
R = 3×3
    1.0000    2.0000    0.5000
         0    3.2000    4.0000
    2.0000    5.1000    0.8000
```

```
[eivec, eival] = eig( R )
```

```
eivec = 3×3
   -0.2252   -0.8872   -0.2857
    0.5715    0.3739   -0.6936
   -0.7891   -0.2702   -0.6613
eival = 3×3
   -2.3228         0         0
         0    0.3094         0
         0         0    7.0135
```

Funciones elementales

Graficar:

$y_1(t) = cos(\omega t + \phi)$

$y_2(t) = sin(\omega t)$

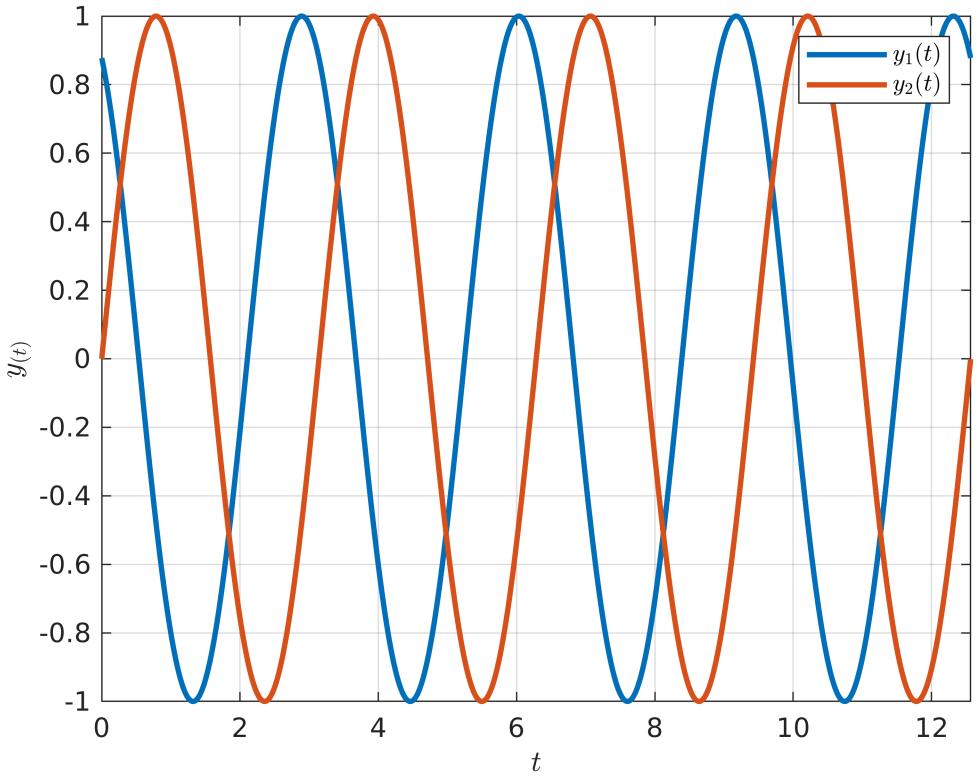
para $0 \leq t \leq 4\pi$

```
set(0,'defaulttextInterpreter','latex')
set(0, 'defaultLegendInterpreter', 'latex')
t = 0 : 0.001 : 4*pi;
y_1 = cos( 2.*t + 0.5);
y_2 = sin( 2.*t )
```

```
y_2 = 1×12567
         0    0.0020    0.0040    0.0060    0.0080    0.0100    0.0120    0.0140 ···
```

```
figure(1)
clf
plot( t, y_1, 'Linewidth', 2 )
hold on
plot(t, y_2, 'Linewidth', 2)
grid on
xlim([0, 4*pi])
legend('$y_1(t)$', '$y_2(t)$')
```

```
xlabel('$t$')
ylabel('$y_{(t)}$')
```



Graficar:

$y_3(t) = e^{(-at)}$

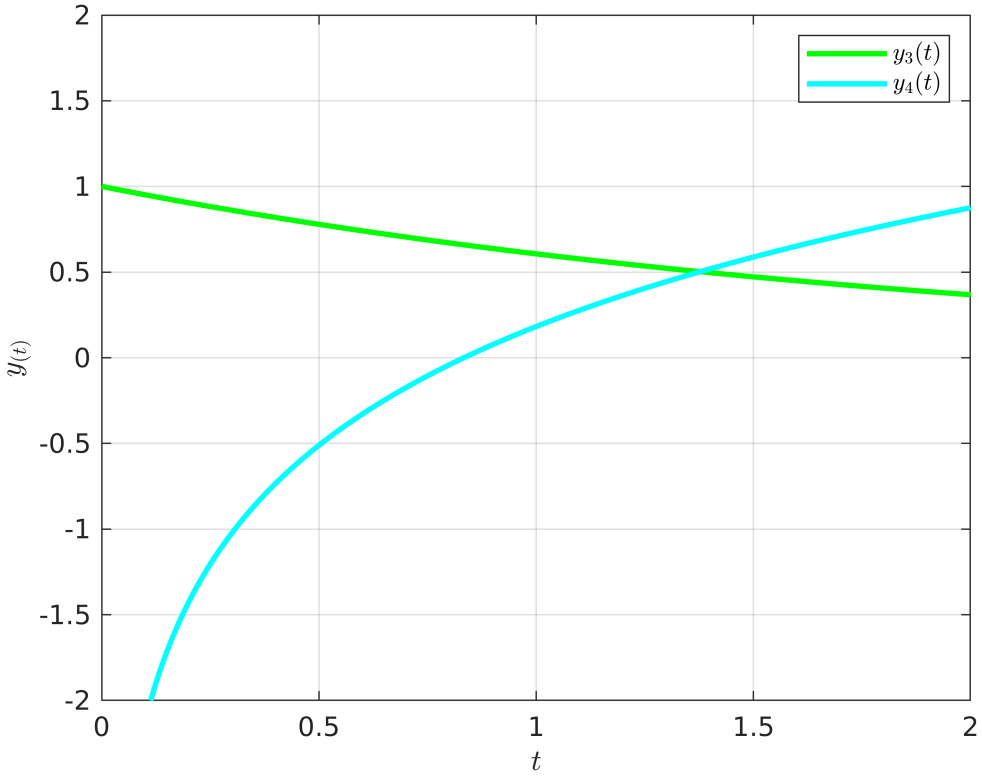
$y_4(t) = \ln(bt)$

```
t = 0 : 0.001 : 2;
a = 0.5;
b = 1.2;

y_3 = exp( -a.*t );
y_4 = log( b.*t );

figure(2)
clf
plot( t, y_3, 'color', 'g', 'Linewidth', 2 )
hold on
plot( t, y_4, 'color', 'c', 'Linewidth', 2 )
grid on
ylim([-2, 2])
legend('$y_3(t)$', '$y_4(t)$')
xlabel('$t$')
```

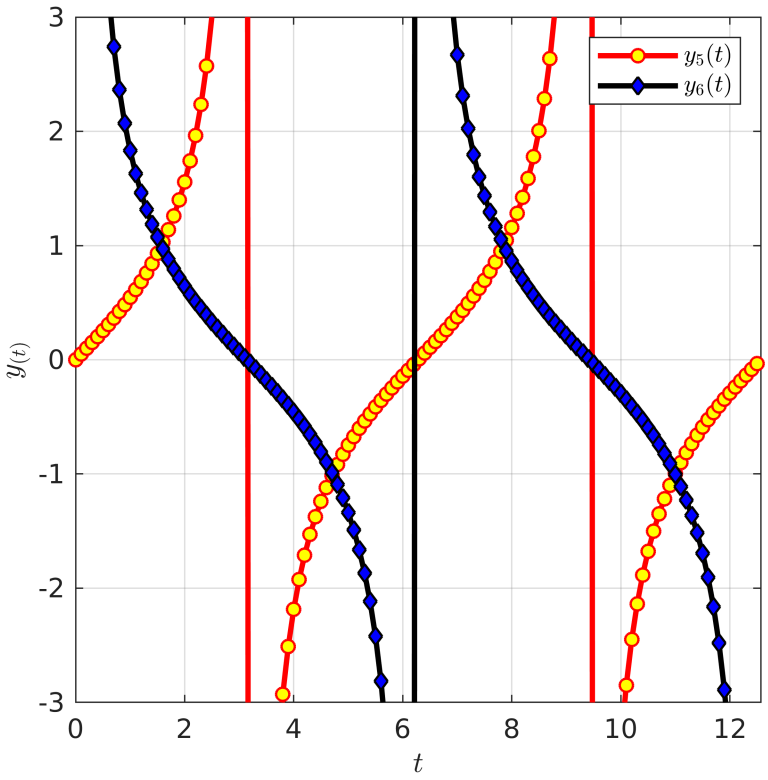
```
ylabel('$y_{(t)}$')
```




```
t = 0 : 0.1 : 4*pi;

y_5 = tan( 0.5.*t );
y_6 = cot( 0.5.*t );

figure(3)
clf
plot( t, y_5, 'color', 'r', 'Linewidth', 2, 'Marker', 'o', 'Markersize', 5,...
    'MarkerFaceColor',  'y')
hold on
plot( t, y_6, 'color', 'k', 'Linewidth', 2, 'Marker', 'd', 'Markersize', 5,...
    'MarkerFaceColor',  'b'  )
grid on
ylim([-3, 3])
xlim([0, 4*pi])
legend('$y_5(t)$', '$y_6(t)$')
xlabel('$t$')
ylabel('$y_{(t)}$')
pbaspect([1 1 1])
print('tan_cot','-dpdf', '-fillpage')
```



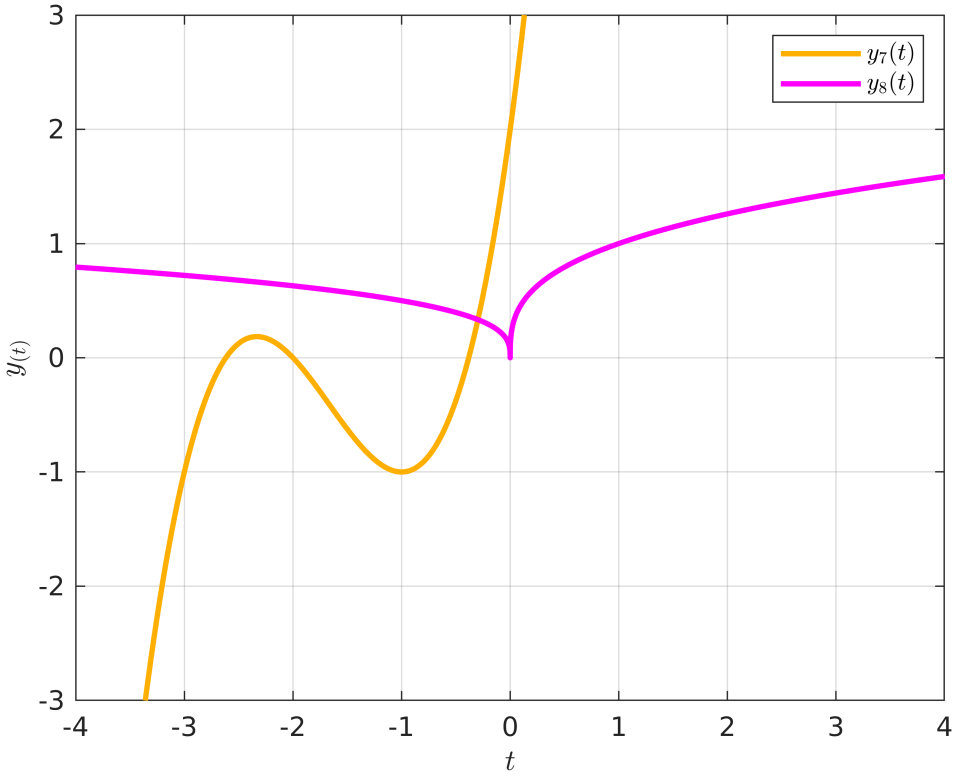

```
t = -10 : 0.001 : 10;

y_7 = t.^3 + 5.*t.^2 +7.*t +2;
y_8 = t.^(1/3);

figure(4)
clf
plot( t, y_7, 'color', [1.0, 0.7, 0.0], 'Linewidth', 2 )
hold on
plot( t, y_8, 'color', 'm', 'Linewidth', 2 )
```

```
Warning: Imaginary parts of complex X and/or Y arguments ignored
```

```
grid on
ylim([-3, 3])
xlim([-4,4])
legend('$y_7(t)$', '$y_8(t)$')
xlabel('$t$')
ylabel('$y_{(t)}$')
```


$y_7(t)$
$y_8(t)$
$y_{(t)}$
t
3
2
1
0
-1
-2
-3
-4
-3
-2
-1
0
1
2
3
4