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EJERCICIOS
INTRODUCCIÓN AL MATLAB

EJERCICIO 1

```
A = [1  3 5; 7 9 11]

A =  1     3     5
     7     9    11


A(2,3)=0

A =  1     3     5
     7     9     0


B=A'

B =  1     7
     3     9
     5     0


C=[B eye(3)]

C =  1     7     1     0     0
     3     9     0     1     0
     5     0     0     0     1


D=[C(1:3,1:2:5)]

D =  1     1     0
     3     0     0
     5     0     1
```

```
E=[C(1:2,3) C(1:2,5)]

E =  1     0
     0     0


F=[C(1:2,3:5)]

F =  1     0     0
     0     1     0


G=[diag(diag(D))]

G =  1     0     0
     0     0     0
     0     0     1
```

EJERCICIO 2

```
A=[eye(5,4) zeros(5,4) ones(5,4)]

A =

1     0     0     0     0     0     0     0     1     1     1     1
0     1     0     0     0     0     0     0     1     1     1     1
0     0     1     0     0     0     0     0     1     1     1     1
0     0     0     1     0     0     0     0     1     1     1     1
0     0     0     0     0     0     0     0     1     1     1     1

a=A(1,1:size(A,2))

a= 1     0     0     0     0     0     0     0     1     1     1     1

B=[A(1:2:5,2:2:12)]

B =  0     0     0     0     1     1
     0     0     0     0     1     1
     0     0     0     0     1     1
```

EJERCICIO 3

```
A=[0.6 1.5 2.3 -0.5; 8.2 0.5 -0.1 -2.0 ;5.7 8.2 9 1.5 ; 0.5
0.5 2.4 0.5]

A = 0.6000    1.5000    2.3000   -0.5000
    8.2000    0.5000   -0.1000   -2.0000
    5.7000    8.2000    9.0000    1.5000
    0.5000    0.5000    2.4000    0.5000


Inv=inv(A)
Inv =  -0.2367    0.1116    0.0290    0.1227
        0.0862   -0.0711    0.1500   -0.6482
        0.2315    0.0041   -0.0706    0.4599
       -0.9606   -0.0603    0.1600    0.3180


Trasp=A'
Trasp =


    0.6000    8.2000    5.7000    0.5000
    1.5000    0.5000    8.2000    0.5000
    2.3000   -0.1000    9.0000    2.4000
   -0.5000   -2.0000    1.5000    0.5000


diag=diag(A)
diag = 0.6000
       0.5000
       9.0000
       0.5000
```

```
[L,U]=lu(A)

L = 0.0732    0.1864    0.3311    1.0000
    1.0000         0         0         0
    0.6951    1.0000         0         0
    0.0610    0.0598    1.0000         0

U = 8.2000    0.5000   -0.1000   -2.0000
         0    7.8524    9.0695    2.8902
         0         0    1.8638    0.4491
         0         0         0   -1.0410

sumdiag=trace(A)
sumdiag = 10.6000

suma= sum(A(1,1:size(A,2)))
suma = 3.9000

Sub1=[A(1:2,1:2)]
Sub1 = 0.6000    1.5000
       8.2000    0.5000

Sub2=[A(1:2:3,1:2:3)]
Sub1 = 0.6000    2.3000
       5.7000    9.0000
```

EJERCICIO 4

```
A=diag(-5:5,0) + diag(ones(1,10),1)+diag(-1*ones(1,10),-1)
```

```
A =
```

-5	1	0	0	0	0	0	0	0	0	0
-1	-4	1	0	0	0	0	0	0	0	0
0	-1	-3	1	0	0	0	0	0	0	0
0	0	-1	-2	1	0	0	0	0	0	0
0	0	0	-1	-1	1	0	0	0	0	0
0	0	0	0	-1	0	1	0	0	0	0
0	0	0	0	0	-1	1	1	0	0	0
0	0	0	0	0	0	-1	2	1	0	0
0	0	0	0	0	0	0	-1	3	1	0
0	0	0	0	0	0	0	0	-1	4	1
0	0	0	0	0	0	0	0	0	-1	5

EJERCICIO 5

```
a=(cumprod(1:10))
```

```
   a = 1   2   6   24    120   720   5040   40320   362880   3628800
```

```
b=sum(1./a)
```

```
   b = 1.7183
```

```
c =sum((1./cumprod(1:10)).*(2*ones(1,10)).^(1:10))
```

```
c = 6.3890
```

EJERCICIO 6

```
n=50;

v0=1:n;

v1=2:n;

v2=1:n-1;

A=sparse(diag(v0,0)+diag(v1,1)+diag(v2,-1))
```

```
A =(1,1)         1
   (2,1)         1
   (1,2)         2
   (2,2)         2
   (3,2)         2
   (2,3)         3
   (3,3)         3
   (4,3)         3
   (3,4)         4
   (4,4)         4
   (5,4)         4
   (4,5)         5
   (5,5)         5
   (6,5)         5
   (5,6)         6
   (6,6)         6
   (7,6)         6
   (6,7)         7
   (7,7)         7
   (8,7)         7
   (7,8)         8
   (8,8)         8
   (9,8)         8
   (8,9)         9
   (9,9)         9
  (10,9)         9
   (9,10)       10
  (10,10)       10
  (11,10)       10
  (10,11)       11
  (11,11)       11
  (12,11)       11
  (11,12)       12
  (12,12)       12
  (13,12)       12
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  (13,14)       14
  (14,14)       14
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(47,47)	47
(48,47)	47
(47,48)	48
(48,48)	48
(49,48)	48
(48,49)	49
(49,49)	49
(50,49)	49
(49,50)	50
(50,50)	50

EJERCICIO 7

```
a=pi.*(1:5)
  a =  3.1415   6.2831  9.4247  12.5663  15.

b=exp(1).*(1:5)
  b = 2.7182   5.4365  8.1548  10.8731  13.5914

c =sin(a)+B
  c = 2.7182   5.4365   8.1548  10.8731  13.5914

d=cos(a)
  d = -1     1    -1     1    -1

e=log(b)
  e =    1 1.6931   2.0986   2.3862   2.6094

f=c.*d
  f = -2.7182   5.4365  -8.1548  10.8731 -13.5914

g=c./d
  g = -2.7182   5.4365  -8.1548  10.8731 -13.5914

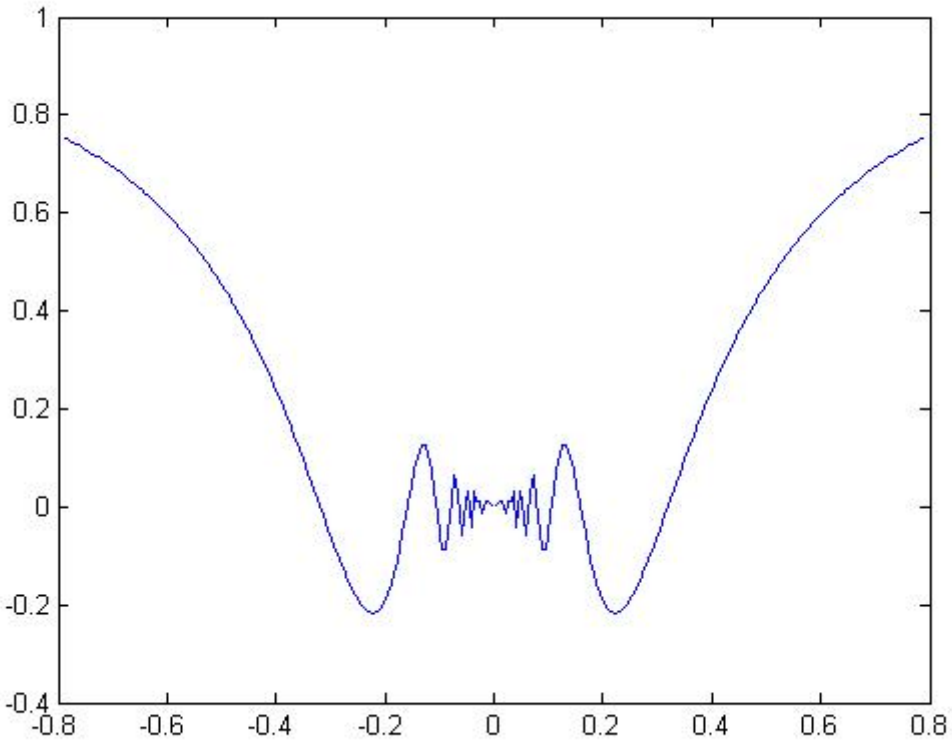
h=d.^2
  h =  1     1     1     1     1

i =(d.^2)-(e.^2)
  i = 0  -1.8667  -3.4041  -4.6944  -5.8091

j =3.*(d.^3)-(2.*(e.^2))
  j = -5  -2.7334 -11.8083  -8.3888 -16.6183
```

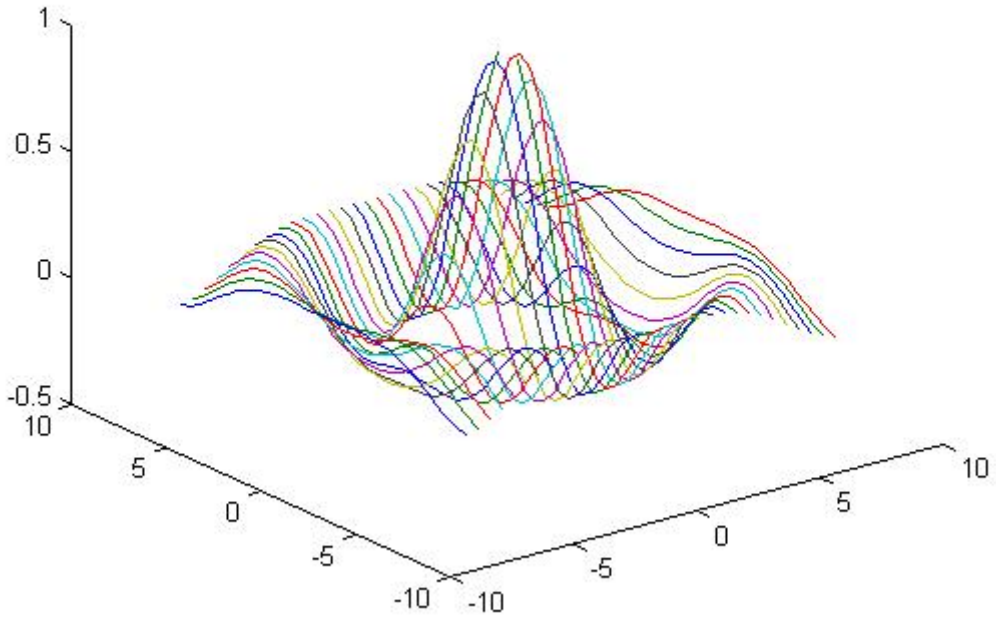
EJERCICIO 8

```
v=linspace((-pi/4),(pi/4),301);
a=v.*sin(1./v);
plot(v,a)
```



EJERCICIO 9

```
x=-7.5:0.5:7.5;
y=-7.5:0.5:7.5;
[X,Y]= meshgrid(-7.5:0.5:7.5,-7.5:0.5:7.5);
Z=sin(sqrt((X.^2)+(Y.^2)))./(sqrt((X.^2)+(Y.^2)));
plot3(X,Y,Z)
```

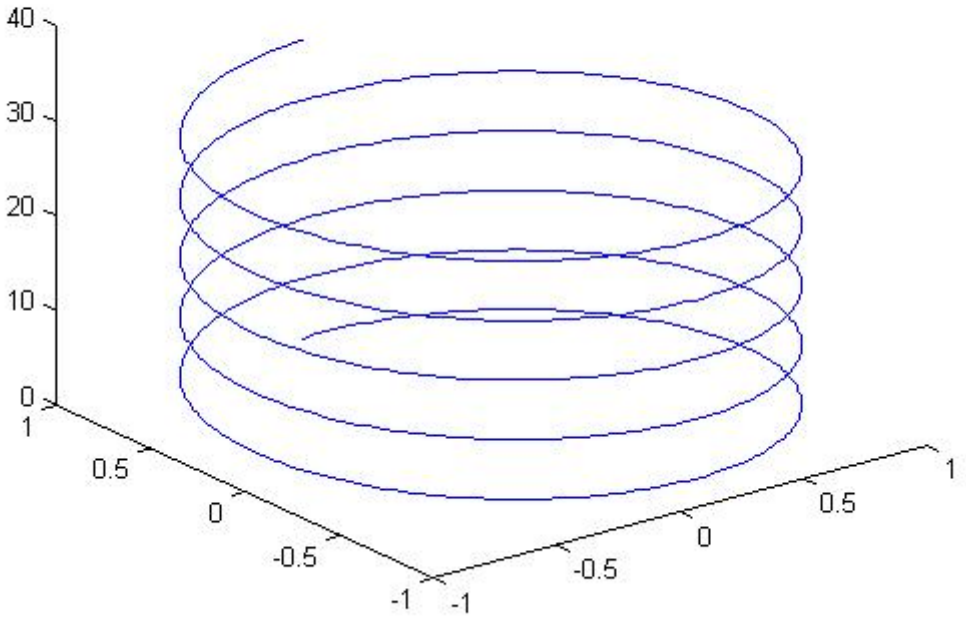


EJERCICIO 10

```
function graf

   t=pi.*(0:0.01:10);
   x=sin(t);
   y=cos(t);
   z=t;
   plot3(x,y,z)

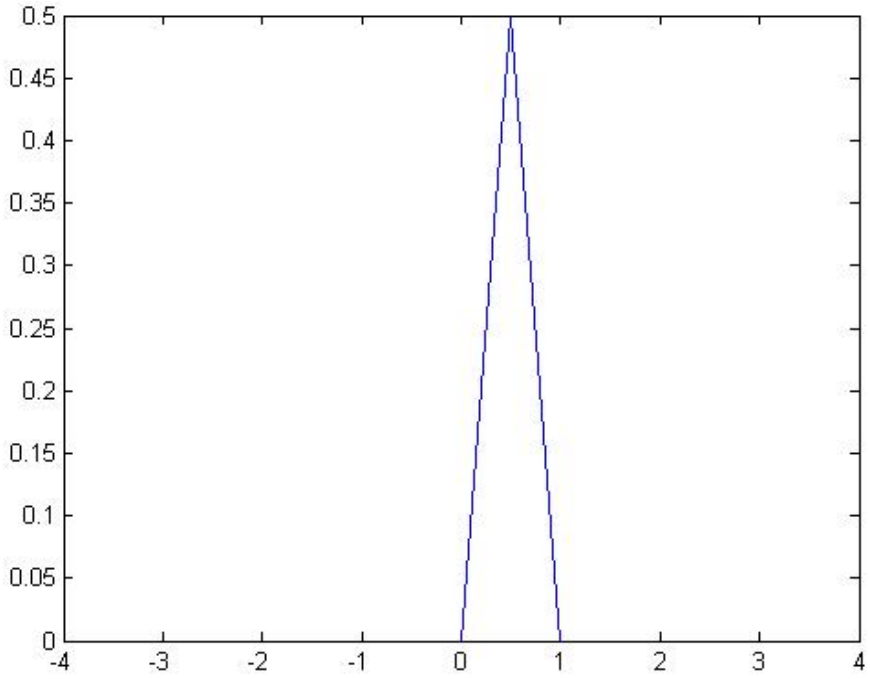
end
```



EJERCICIO 11

```
x=-4:0.5:4;
z=Ejercicio_11(x)
```

```
function y = Ejercicio_11( x )
      y=zeros(size(x))
      cond1=find(0<x & x<=0.5);
         y(cond1)=x(cond1);
      cond2=find(0.5<x & x<=1);
         y(cond2)=1-x(cond2);
      cond3=find(x<0 | x>1);
         y(cond3)=0;
      plot(x,y)
end
```



EJERCICIO 12

```
a=[2 5 -1 0 2 1]
a =   2    5   -1    0    2    1

x=-3:3
x = -3  -2  -1   0   1   2   3

resultado= Ejercicio12_Horner ( a,x )
resultado = -59   21    3    1    9  141  871
```

```
function resultado= Ejercicio12_Horner( a, x )
      p=[];
      p=a(1);
      n=length(a);
      for j=1:n-1
            p = p.*x + a(j+1);
```

```
        end
       resultado=p;
end
```

EJERCICIO 13

APARTADO a) Metodo de Newton-Raphson

```
function [x,k]= Ejercicio13a_NewtonRaphson(f,fd,x0,e_ref)
  e=inf;
  x=x0;
  k=0;
    while k<=100 & e>e_ref
      xn=x-(f(x)/fd(x));
      e=abs(xn-x)/abs(xn);
      k=k+1;
      x=xn;
    end
end
```

```
format long;
x0=1.8
e_ref=10^(-16);
f=@(x) exp(1)^x+2^(-x)+2*cos(x)-6;
```

```
fd=@(x) exp(1)^x-logm(2)*2^(-x)-2*sin(x);

[x,k]= Ejercicio13a_NewtonRaphson(f,fd,x0,e_ref);
```

APARTADO b) Metodo de la Secante

```
function [x,k]= Ejercicio13b_Secante(f,e_ref,x0,x1)
  x1=x1;
  x0=x0;
  e=inf;
  k=0;
    while k<=100 & e>e_ref
      x=x1-((f(x1)*(x1-x0))/(f(x1)-f(x0)));
      e=abs((x-x1)/x);
      x0=x1;
      x1=x;
      k=k+1;
    end
end
```

```
x0=1.8;
x1=1.9;
e_ref=10^(-16);
```

```
f=@(x) exp(1)^x+2^(-x)+2*cos(x)-6;
[x,k]= Ejercicio13b_Secante(f,e_ref,x0,x1)
```

EJERCICIO 14

```
function [x]=Solucion_14(a,b,c,d)
Ponerle al vector b un cero delante para q cuadren las
formulas que te dan
  for i=length(b)+1:-1:2
         b(i)=b(i-1);
      end
        b(1)=0;
n=length(a);
Factorizacion
      alfa(1)=a(1);
        for i=1:n-1
           gamma(i)=c(i)/alfa(i);
           alfa(i+1)=a(i+1)-(b(i+1)*gamma(i));
        end
Obtener vector y
```

```
    y(1)=d(1)/alfa(1);
       for i=2:n
          y(i)=(d(i)-(b(i)*y(i-1)))/alfa(i);
       end

Obtener vector x
    x(n)=y(n);
       for i=n-1:-1:1
          x(i)=y(i)-(gamma(i)*x(i+1));
       end
end
```

```
a=[5 5 5 5 5];
b=[-3 -2 -2 -1];
c=[-1 -1 -3 -1];
d=[1 0 0 0 1];
[x]= Ejercicio14_FacorizacionCrout(a,b,c,d)
```

```
x = 0.2328    0.1638    0.1207    0.0920    0.2184
```

EJERCICIO 15

```
function [x_new,k]= Ejercicio15_GaussSeidel(x0,A,b,e_ref)

  A=sparse(A);
  n=length(b);
  x_old=x0;
  x_new=zeros(n,1);
  k=0;
  e=inf;

  while  k<=45 & e>e_ref

    for i=1:n
      j1=1:(i-1);
      j2=(i+1):n;
      C=-sum(x_new(j1)'.*A(i,j1));
```

```
      D=-sum(x_old(j2)'.*A(i,j2));
      x_new(i)=(b(i)+ C + D)*1/A(i,i);
      e=abs(norm(x_new-x_old)/norm(x_new));
    end

    k=k+1;
    x_old=x_new;

  end

end
```

```
format long
n=500;
diagprincipal = 5 * ones(n, 1);
diag1 = -1*ones(n - 1, 1);
diag2 = -1*ones(n - 2, 1);
A = diag(diagprincipal) + diag(diag1, 1) + diag(diag1,-1);
A(3:n,1)=-1;
A(1:n-2,n)=-1;

A=sparse(A);
b=zeros(n,1);
b(1:3:n,1)=1;
x0=zeros(n,1);
e_ref=10^(-16);
```

```
[x_new,k]=Ejercicio_15(x0,A,b,e_ref)
```