Tema lab02

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Metoda bisectiei

```
function [x] = MetBisectie(f, a, b, eps)
    N = floor(log2((b-a)/eps));
    x = (a+b)/2;
    for k = 1:N
        if f(x)==0
            break;
        elseif sign(f(a))*sign(f(x))<0
            b = x;
        else
            a = x;
        end
        x = (a+b)/2;
    end
end
```

Metoda Newton-Raphson

```
function [x_aprox] = MetNR(f, df, x0, eps)
  k=2;
  x(1) = x0;
  x(k) = x(k-1)-f(x(k-1))/df(x(k-1));
  while abs(x(k)-x(k-1))/abs(x(k-1)) >= eps
      k = k+1;
      x(k) = x(k-1)-f(x(k-1))/df(x(k-1));
  end
```

```
  x_aprox = x(k);
end
```

Metoda secantei

```
function [x_aprox, N] = MetSecantei(f,a,b,x0,x1,eps)
  x(1) = x0;
  x(2) = x1;
  k = 2;
  while abs(x(k)-x(k-1))/abs(x(k-1)) >= eps
      k = k+1;
      x(k) = (x(k-2)*f(x(k-1))-x(k-1)*f(x(k-2)))/(f(x(k-1))-
f(x(k-2)));
      if x(k)<a || x(k)>b
          disp 'Introduceti alte valori pentru x0, x1';
          return;
      end
  end
  x_aprox = x(k);
  N = k;
end
```

Metoda pozitiei false

```
function [x_aprox, N] = MetPozFalse(f, a, b, eps)
    N = floor(log2((b-a)/eps));
    x = (a+b)/2;
    k = 1;
    x(k) = (a*f(b)-b*f(a))/(f(b)-f(a));
    k=k+1;
    if sign(f(a))*sign(f(x(k-1)))<0
        b = x(k-1);
    else
        a = x(k-1);
    end
    x(k) = (a*f(b)-b*f(a))/(f(b)-f(a));
    while abs(x(k)-x(k-1))/abs(x(k-1)) >= eps
        k=k+1;
        if f(x(k-1))==0
            break;
        elseif sign(f(a))*sign(f(x(k-1)))<0
            b = x(k-1);
        else
            a = x(k-1);
        end
        x(k) = (a*f(b)-b*f(a))/(f(b)-f(a));
    end
    x_aprox=x(k);
    N = k;
```

```
end
```

SubsDesc

```
function [x] = SubsDesc(A, b)
   n = length(b);
   x(n) = b(n)/A(n,n);
   for k=n-1:-1:1
      suma = 0;
      for j=k+1:n
          suma = suma + A(k,j)*x(j);
      end
      x(k) = (b(k) - suma)/A(k,k);
   end
   x = x';
end
```

Gauss fara pivotare

```
function [x] = GaussFaraPiv(A,b)
  n = length(b);
  A = [A b];
  for k=1:n-1
      for p=k:n
          if A(p,k)~=0
              break
          end
      end
      if p~=k
          A([p k],:) = A([k p],:);
      end
      for l=k+1:n
          mlk = A(l,k)/A(k,k);
          A(l,:) = A(l,:) - mlk*A(k,:);
      end
  end
  if A(n,n)==0
      disp 'Sistem incompatibil sau sistem compatibil nedeterminat';
      return;
  end
  x = SubsDesc(A(:,1:n),A(:,n+1));
end
```

Gauss pivotare partiala

```
function [x] = GaussPivPart(A,b)
```

```
  n = length(b);
  A = [A b];
  for k=1:n-1
      apk = 0;
      for j=k:n
          if abs(A(j,k))>apk
              apk = abs(A(j,k));
              p = j;
          end
      end
      if apk==0
        disp 'Sistem incompatibil sau sistem compatibil nedeterminat';
        return;
      end
      if p~=k
          A([p k],:) = A([k p],:);
      end
      for l=k+1:n
          mlk = A(l,k)/A(k,k);
          A(l,:) = A(l,:) - mlk*A(k,:);
      end
  end
  if A(n,n)==0
      disp 'Sistem incompatibil sau sistem compatibil nedeterminat';
      return;
  end
  x = SubsDesc(A(:,1:n),A(:,n+1));
end
```

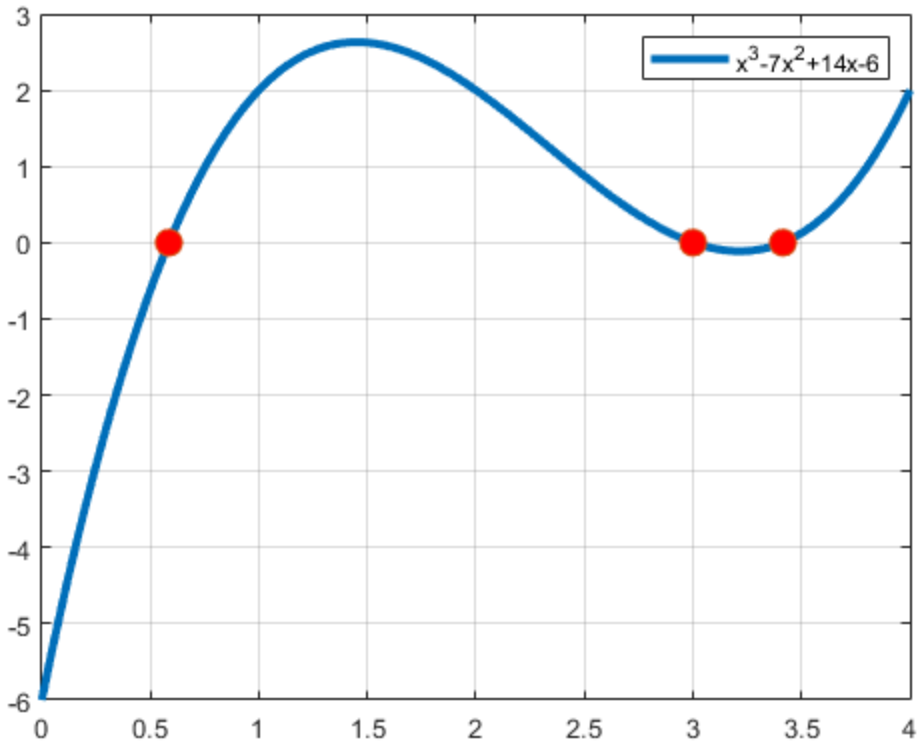
Gauss pivotare totala

```
function [x] = GaussPivTot(A,b)
  n = length(b);
  A = [A b];
  index = 1:n;
  for k=1:n-1
      apm = 0;
      for i=k:n
          for j=k:n
              if abs(A(i,j))>apm
                  apm = abs(A(i,j));
                  p = i;
                  m = j;
              end
          end
      end
      if apm==0
        disp 'Sistem incompatibil sau sistem compatibil nedeterminat';
        return;
      end
      if p~=k
```

```
            A([p k],:) = A([k p],:);
        end
        if m~=k
            A(:,[m k]) = A(:,[k m]);
            index([m k]) = index([k m]);
        end
        for l=k+1:n
            mlk = A(l,k)/A(k,k);
            A(l,:) = A(l,:) - mlk*A(k,:);
        end
    end
    if A(n,n)==0
        disp 'Sistem incompatibil sau sistem compatibil nedeterminat';
        return;
    end
    x_tmp = SubsDesc(A(:,1:n),A(:,n+1));
    for i=1:n
        x(i) = x_tmp(index(i));
    end
    x = x';
end
```

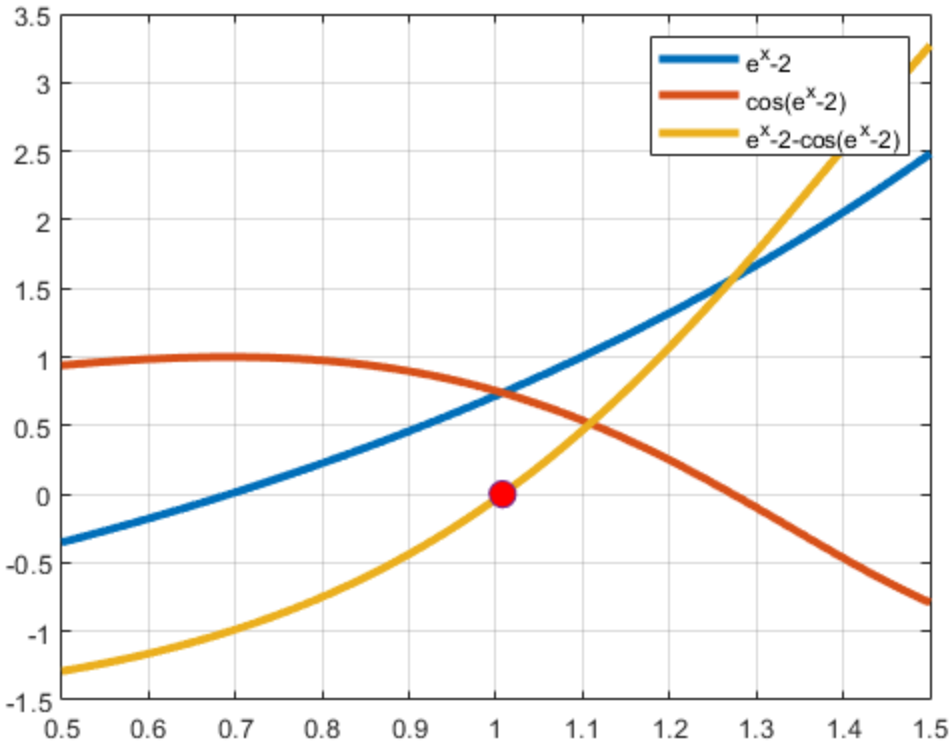
Problema 2

```
clear all;
f = inline(vectorize('x^3 - 7*x^2 + 14*x - 6'), 'x');
eps = 10^(-5);
a = [0 1 3.2];
b = [1 3.2 4];
for i=1:3
    x_aprox(i) = MetBisectie(f, a(i), b(i), eps);
end
x = linspace(0,4,100);
y = f(x);
plot(x,y, 'Linewidth', 3);
hold on;
plot(x_aprox, f(x_aprox), 'o', 'MarkerFaceColor', 'r', 'MarkerSize',
 10);
legend('x^3-7x^2+14x-6');
grid on;
hold off;
```



Problema 3

```
clear all;
f1 = inline(vectorize('exp(x)-2'), 'x');
f2 = inline(vectorize('cos(exp(x)-2)'), 'x');
f3 = inline(vectorize('exp(x)-2-cos(exp(x)-2)'), 'x');
a = 0.5;
b = 1.5;
x = linspace(a,b,100);
eps = 10^(-5);
x_aprox = MetBisectie(f3,a,b,eps);
plot(x, f1(x), 'Linewidth', 3);
hold on;
grid on;
plot(x, f2(x), 'Linewidth', 3);
plot(x, f3(x), 'Linewidth', 3);
plot(x_aprox, f3(x_aprox), 'o', 'MarkerFaceColor', 'r', 'MarkerSize',
 10);
legend('e^x-2', 'cos(e^x-2)', 'e^x-2-cos(e^x-2)');
hold off;
```



Problema 4

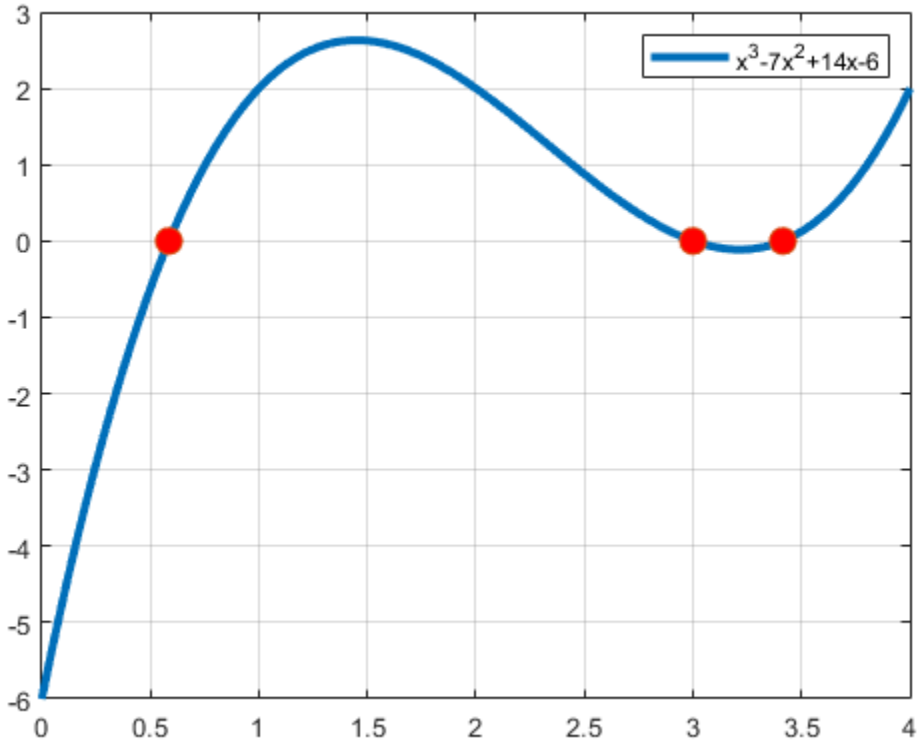
```
clear all;
a = 0;
b = 3;
f1 = inline(vectorize('x-sqrt(3)'), 'x');
eps = 10^(-5);
x_aprox = MetBisectie(f1,a,b,eps);
x_aprox
```

```
x_aprox =

    1.7320
```

Problema 6

```
clear all;
syms x;
f = x^3 - 7*x^2 + 14*x - 6;
df = diff(f,x);

f = matlabFunction(f, 'vars', {x});
df = matlabFunction(df, 'vars', {x});
```

```
a = [0 1 3.2];
b = [1 3.2 4];
eps = 10^(-5);
for i=1:3
    x_aprox(i) = MetNR(f, df, (a(i)+b(i))/2, eps);
end
x = linspace(0,4,100);
y = f(x);
plot(x,y, 'Linewidth', 3);
hold on;
plot(x_aprox, f(x_aprox), 'o', 'MarkerFaceColor', 'r', 'MarkerSize',
 10);
legend('x^3-7x^2+14x-6');
grid on;
hold off;
```

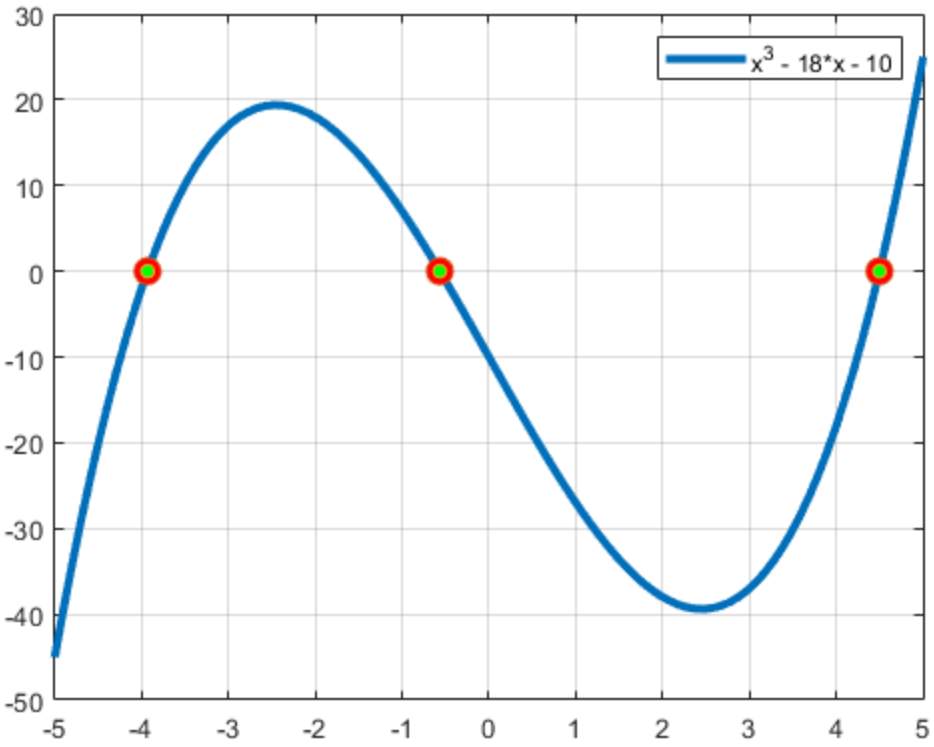


Problema 8

```
clear all;
syms x;
f = inline(vectorize('x^3 - 18*x - 10'), 'x');

a = [-5 -2.5 2.5];
b = [-2.5 0 5];
eps = 10^(-5);
```

```
for i=1:3
    [x_aprox_MetSecantei(i),N_MetSecantei(i)] =
 MetSecantei(f,a(i),b(i),a(i)+1,b(i)-1,eps);
    [x_aprox_MetPozFalse(i),N_MetPozFalse(i)] =
 MetPozFalse(f,a(i),b(i),eps);
end
x = linspace(-5,5,100);
y = f(x);
plot(x,y, 'Linewidth', 3);
hold on;
plot(x_aprox_MetSecantei,
 f(x_aprox_MetSecantei), 'o', 'MarkerFaceColor', 'r', 'MarkerSize',
 10);
plot(x_aprox_MetSecantei,
 f(x_aprox_MetSecantei), 'o', 'MarkerFaceColor', 'g', 'MarkerSize',
 5);
legend('x^3 - 18*x - 10');
grid on;
hold off;
if sum(N_MetSecantei)<sum(N_MetPozFalse)
    disp 'Metoda secantei este mai eficienta'
elseif sum(N_MetSecantei)>sum(N_MetPozFalse)
    disp 'Metoda pozitiei false este mai eficienta'
else
    disp 'Ambele metode sunt la fel de eficiente'
end
```

Metoda secantei este mai eficienta



Problema 10

```
clear all;
A = [1 2 3
    0 4 5
    0 0 6];
b = [8;14;12];
x = SubsDesc(A,b)
```

```
x =

     0
     1
     2
```

Problema 11

```
clear all;
A1 = [0 1 1
     2 1 5
     4 2 1];
b1 = [3; 5; 1];
A2 = [0 1 -2
```

```
      1 -1 1
      1 0 -1];
b2 = [4;6;2];

GaussFaraPiv(A1,b1)'
GaussFaraPiv(A2,b2)

GaussPivPart(A1,b1)'
GaussPivPart(A2,b2)

GaussPivTot(A1,b1)'
GaussPivTot(A2,b2)

eps = 10^(-20);
Aeps = [eps 1
        1 1];
beps = [1;2];
GaussFaraPiv(Aeps,beps)'
GaussPivPart(Aeps,beps)'

C = 10^20;
AC = [1 C
      1 1];
bC = [C; 2];
GaussPivPart(AC,bC)'
GaussPivTot(AC,bC)'


ans =

    -1     2     1

Sistem incompatibil sau sistem compatibil nedeterminat

ans =

    -1     2     1

Sistem incompatibil sau sistem compatibil nedeterminat

ans =

     2     1    -1

Sistem incompatibil sau sistem compatibil nedeterminat

ans =

     0     1


ans =

     1     1
```

```
ans =

     0     1

ans =

     1     1
```

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