

ΤΕΧΝΙΚΕΣ ΒΕΛΤΙΣΤΟΠΟΙΗΣΗΣ

2η Εργαστηριακή Άσκηση

Ελαχιστοποίηση με χρήση παραγώγων

Matlab code

ΚΩΝΣΤΑΝΤΙΝΟΣ ΚΩΣΤΑΣ

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Θεμα 1

t=@(x,y) ((x^3)\*exp(-(x^2)-(y^4)));

%fsurf(t);

fcontour(t);

hold on

Θεμα 2

syms x y g

f1=@(x,y)(x^3)\*exp(-(x^2)-(y^4));

dfdx=diff(f1,x);

dfdy=diff(f1,y);

efinish=0.0001;

X=1:100;

Y=1:100;

X(1)=-1;

Y(1)=-1;

k=1;

plot(X(1),Y(1),'o');

hold on

while sqrt((subs(dfdx,[x,y],[X(k),Y(k)]))^2+(subs(dfdy,[x,y],[X(k),Y(k)])^2))>= efinish

A=-subs(dfdx,[x,y],[X(k),Y(k)]);

B=-subs(dfdy,[x,y],[X(k),Y(k)]);

dx=@(g) X(k)+g\*A;

dy=@(g) Y(k)+g\*B;

%f2=@(g) f1(dx(g),dy(g));

%dmin=fminsearch(f2,0);

dmin=1.1;

k=k+1;

X(k)=dx(dmin);

Y(k)=dy(dmin);

plot(X(k),Y(k),'o');

hold on

end

Θεμα 3

syms x y g

f1=@(x,y)(x^3)\*exp(-(x^2)-(y^4));

dfdx=diff(f1,x);

fxx=diff(dfdx,x);

fxy=diff(dfdx,y);

dfdy=diff(f1,y);

fyx=diff(dfdy,x);

fyy=diff(dfdy,y);

jac=[fxx fxy;fyx fyy];

invjac=inv(jac);

help=[dfdx;dfdy];

dk=-invjac\*help;

efinish=0.0001;

X=1:100;

Y=1:100;

X(1)=-1;

Y(1)=-1;

k=1;

plot(X(1),Y(1),'o');

hold on

while sqrt((subs(dfdx,[x,y],[X(k),Y(k)]))^2+(subs(dfdy,[x,y],[X(k),Y(k)])^2))>= efinish

A=subs(dk(1),[x,y],[X(k),Y(k)]);

B=subs(dk(2),[x,y],[X(k),Y(k)]);

dx=@(g) X(k)+g\*A;

dy=@(g) Y(k)+g\*B;

f2=@(g) f1(dx(g),dy(g));

dmin=fminsearch(f2,0);

% dmin=1.1;

k=k+1;

X(k)=dx(dmin);

Y(k)=dy(dmin);

plot(X(k),Y(k),'o');

hold on

end

Θεμα 4

syms x y g

f1=@(x,y)(x^3)\*exp(-(x^2)-(y^4));

dfdx=diff(f1,x);

fxx=diff(dfdx,x);

fxy=diff(dfdx,y);

dfdy=diff(f1,y);

fyx=diff(dfdy,x);

fyy=diff(dfdy,y);

jac=[fxx fxy;fyx fyy];

help=[dfdx;dfdy];

efinish=0.01;

X=1:100;

Y=1:100;

X(1)=-1;

Y(1)=-1;

k=1;

plot(X(1),Y(1),'o');

hold on

M=0.5;

contains\_negative=false;

while sqrt((subs(dfdx,[x,y],[X(k),Y(k)]))^2+(subs(dfdy,[x,y],[X(k),Y(k)])^2))>= efinish

eigjac=eig(subs(jac,[x,y],[X(k),Y(k)]));

contains\_negative = any(eigjac<0);

if contains\_negative==true

M=min(eigjac);

end

mk=-M+0.5;

help1=(subs(jac,[x,y],[X(k),Y(k)])+mk\*eye(2));

help2=(subs(help,[x,y],[X(k),Y(k)]));

dk=inv(help1)\*(-help);

A=-subs(dfdx,[x,y],[X(k),Y(k)]);

B=-subs(dfdy,[x,y],[X(k),Y(k)]);

f2=@(g) f1(dx(g),dy(g));

dmin=3;

dx=@(g) X(k)+g\*A;

dy=@(g) Y(k)+g\*B;

%f2=@(g) f1(dx(g),dy(g));

%dmin=fminsearch(f2,0);

X(k+1)=dx(dmin);

Y(k+1)=dy(dmin);

k=k+1;

plot(X(k),Y(k),'o');

hold on

end