

# CS227 Assignment (15/11/23)

Name :- MOULIK JAIN

Roll No :- 2201CS49

1. Q. Minimize  $12x^2 - 9xy + 6y^2$  by SD Method with Initial Point (1,1)

```
%moulik jain
%2201cs49
syms x1 x2

function_1 = 12*x1^2 - 9*x1*x2 + 6*x2^2 ;
%the function we need to minimize funcx inline (function_1); %making this function operable
funcx = inline(function_1) ;
funcobjec = @(x) funcx(x(:,1), x(:,2));
grad = gradient(function_1);
gradfuncx = inline(grad);
Hess1= hessian (function_1);
Hessx=inline (Hess1);
x0 = [1 1]; % initial value
maxiter =3; % maximum number of iterations
tolerance = 5e-3; %tolerance to check
iterator =0;
X=[]; %vector to save next data
gradx= @(x) gradfuncx(x(:,1), x(:,2));
while norm (gradx(x0)) > tolerance && iterator< maxiter
X= [X;x0];
Step_length = -gradx(x0);
H = Hessx(x0);
lambda = Step_length' *Step_length./(Step_length'*H*Step_length); %getting the optimum lambda
Xnew = x0+ lambda.*Step_length';
x0 =Xnew;
iterator = iterator +1; %looping
end
fprintf("The optimum Solution is = [%f, %f] \n", x0(1), x0(2));
fprintf("The optimum value of f(x) is= %f \n", funcobjec (x0));
```

```
>> untitled2
The optimum Solution is = [0.089136, 0.299819]
The optimum value of f(x) is= 0.394171
>>
```

2. Q. Minimize  $18x - y + 51x^2 + 21xy + y^2$  by SD Method with Initial Point (1,1)

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/MATLAB DRIVE/01110502.M

```
1 %moulik jain
2 %2201cs49
3 syms x1 x2
4
5 function_1 = 18*x1 - x2 +51*x1^2 +21*x1*x2 +x2^2 ;
6 %the function we need to minimize funcx inline (function_1); %making this function operable
7 funcx = inline(function_1) ;
8 funcobjec = @(x) funcx(x(:,1), x(:,2));
9 grad = gradient(function_1);
10 gradfuncx =inline(grad);
11 Hess1= hessian (function_1);
12 Hessx=inline (Hess1);
13 x0 = [1 1]; % initial value
14 maxiter =3; % maximum number of iterations
15 tolerance = 5e-3; %tolerance to check
16 iterator =0;
17 X=[]; %vector to save next data
18 gradx= @(x) gradfuncx(x(:,1), x(:,2));
19 while norm (gradx(x0)) > tolerance && iterator< maxiter
20 X= [X;x0];
21 Step_length = -gradx(x0);
22 H = Hessx(x0);
23 lambda = Step_length' *Step_length./((Step_length'*H*Step_length)); %getting the optimum lambda
24 Xnew = x0+ lambda.*Step_length';
25 x0 =Xnew;
26 iterator = iterator +1; %looping
27 end
28 fprintf('The optimum Solution is = [%f, %f] \n', x0(1), x0(2));
29 fprintf('The optimum value of f(x) is= %f \n', funcobjec (x0));
```

```
>> untitled2
```

```
The optimum Solution is = [0.301080, -2.324538]
```

```
The optimum value of f(x) is= 3.073252
```

```
>> X
```

```
X =
```

1.0000	1.0000
-0.3299	0.7925
0.1599	-2.3466

```
>> |
```