EE 202 - Mathematical Techniques in Electrical Engineering

LAB 10

Question 1:

Use the steepest descent direction to find the minimum of

$$f(x_1, x_2) = 25x_1^2 + x_2^2$$

Starting at

$$x^{(0)} = [1 \;\; 3]^T$$

With a step size of $\alpha=0.5$. Use 5 iterations.

Solution:

```
clear all;clc;
x=[1;3];
n=5;
alfa=0.5;
for i=1:n
c=[(2)*(25)*(x(1));(2)*(x(2))];
cbar=(c)/(sqrt(c'*c));
x=x-(alfa*cbar);
f=25*((x(1)).^2)+((x(2)).^2)
end
x0=[1;3];
c=[(2)*(25)*(x0(1));(2)*(x0(2))];
cbar=(c)/(sqrt(c'*c));
xopt=x0-(1.0211*cbar);
fopt=25*((xopt(1)).^2)+((xopt(2)).^2)
x1=-10:0.5:10;x2=-10:0.5:10;
[X1,X2] = meshgrid(x1,x2);
fp=25*((X1).^2)+((X2).^2);
c1=surfc(X1,X2,fp);
```

Question 2:

Use the steepest descent direction to find the minimum of

$$f(x_1, x_2) = 3x_1^2 + 2x_2$$

Starting at

$$x^{(0)} = [1 \;\; 2]^T$$

With a step size of $\alpha=0.5$. Use 2 iterations.