

Solutions

Unconstrained Optimization

Your MATLAB script could look like:

```

user = 0;

x = -6:.01:4;
[y, user] = func_e04ab(x, user);

plot(x,y)
title('f(x)=x^{2} + 3x - 5', ...
      'FontAngle','Italic')
xlabel('x')
ylabel('y', 'Rotation',0)

e1 = 0;
e2 = 0;
a = -6; % lower bound
b = 4; % upper bound
maxcal = int32(30);

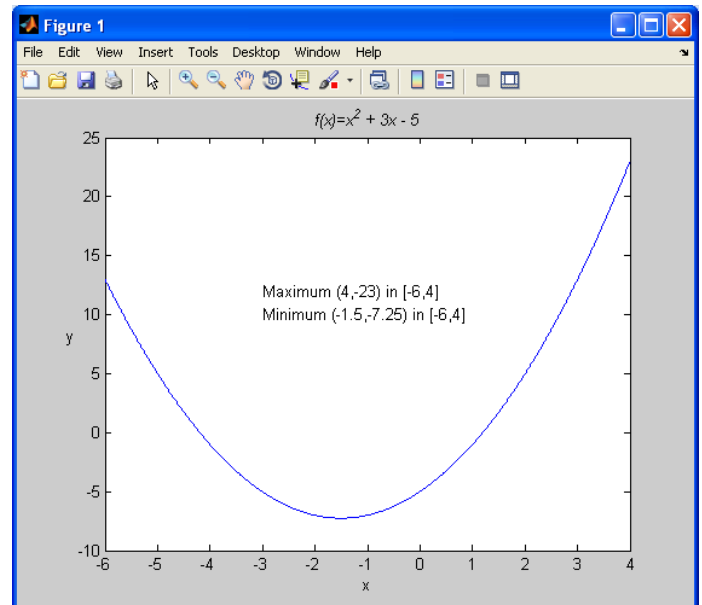
% find minimum
[e1Out, e2Out, aOut, bOut, maxcalOut, x, f, user, ifail] = ...
    e04ab('func_e04ab', e1, e2, a, b, maxcal)

mytext = sprintf('Minimum (%g,%g) in [%g,%g]',x, f, a, b);
text(-3,10,mytext)

% find maximum, i.e minimum of -f(x)
[e1Out, e2Out, aOut, bOut, maxcalOut, x, f, user, ifail] = ...
    e04ab('func_e04ab_neg', e1, e2, a, b, maxcal)

% note we negate f
mytext = sprintf('Maximum (%g,%g) in [%g,%g]',x, f, a, b);
text(-3,12,mytext)

```



Which calls the following function:

```

function [fc, user] = func_e04ab(xc, user)
    fc = xc.^2 + 3*xc - 5;

```

Constrained Optimization

Your MATLAB script could look like:

```
x = -2.5:.01:1.5;
y = -1.1:.01:1.1;
user = 0;
n = 2;

[X,Y] = meshgrid(x,y);

Z = sin(3*Y-X.^2+1)+cos(2*Y.^2-2*X);

contour(x,y,Z,20)
colorbar
hold on

ibound = int32(0); %
bl = [-2;
      -1];
bu = [1;
      1];

plot(bl(1),y)
plot(bu(1),y)
plot(x,bl(2))
plot(x,bu(2))

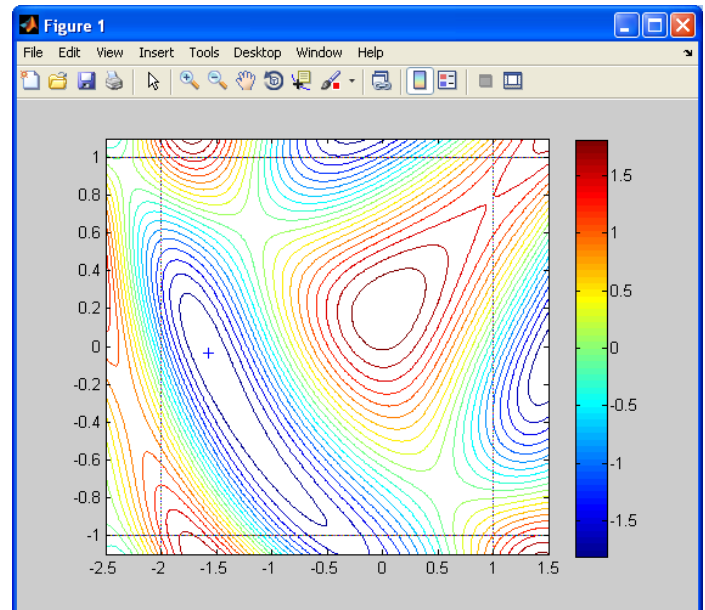
st = [-1; % bad starting point?
      0.6];

tic
[blOut, buOut, xOut, f, iw, w, user, ifail] = ...
    e04jy(ibound, 'func_e04jy', bl, bu, st)
toc

plot(xOut(1),xOut(2),'+')

tic
[blOut, buOut, xOut, f, g, iw, w, user, ifail] = ...
    e04ky(ibound, 'func_e04ky', bl, bu, st)
toc

plot(xOut(1),xOut(2),'o')
hold off
```



Which calls the following function:

```
function [fc, gc, user] = func_e04ky(n, xc, user)
gc = zeros(n, 1);
fc = sin(3*xc(2)-xc(1).^2+1)+cos(2*xc(2).^2-2*xc(1));
gc(1) = 2*(sin(2*xc(2).^2-2*xc(1)) - xc(1)*cos(3*xc(2) ...
          -xc(1).^2+1));
gc(2) = 3*cos(3*xc(2)-xc(1).^2+1) - ...
          4*xc(2)*sin(2*xc(2).^2-2*xc(1));
```