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HW5

Problem 4

The method of fminbnd takes 0.3079 and the method of gradient descent with tstep=0.01 takes 0.0227. The second method is faster because the tstep can replace many steps, which can save a lot of time.

Problem 5

C

Code

%% Problem4

clear; close all; clc

f = @(p) (2-p(1))^2 + (p(2) - p(1)^2)^2;

ans5 = fminsearch(f, [0; 5]);

p = [0; 5]; % The current guess

fgrad = @(p) [-2\*(2-p(1))-4\*p(1)\*(p(2)-p(1)^2); 2\*(p(2)-p(1)^2)];

iteration = 0;

tic

for k = 1:10000

grad = fgrad(p); % Find which direction to go

phi = @ (t) p - t\*grad; % Define the "path"

f\_phi = @ (t) f(phi(t));

tmin = fminbnd(f\_phi,0,1);

p = phi(tmin);

iteration = iteration + 1;

if norm(grad, inf) < 10^(-4)

break

end

end

time\_fmin = toc

ans6 = p;

ans7 = iteration;

f = @(p) (2-p(1))^2 + (p(2) - p(1)^2)^2;

p = [0; 5]; % The current guess

fgrad = @(p) [-2\*(2-p(1))-4\*p(1)\*(p(2)-p(1)^2); 2\*(p(2)-p(1)^2)];

tstep = 0.01;

iteration = 0;

tic

for k = 1:10000

grad = fgrad(p); % Find which direction to go

p = p - tstep\*grad;

iteration = iteration + 1;

if norm(grad, inf) < 10^(-4)

break

end

end

time\_grad = toc

ans8 = iteration;