



THE UNIVERSITY OF TEXAS  
AT AUSTIN

---

EE381V LARGE SCALE OPTIMIZATION

**Problem Set 4**

Edited by L<sup>A</sup>T<sub>E</sub>X

Department of Computer Science

---

STUDENT

**Jimmy Lin**

xl5224

COURSE COORDINATOR

**Sujay Sanghavi**

UNIQUE NUMBER

**17350**

RELEASE DATE

**September 12, 2014**

DUE DATE

**September 18, 2014**

TIME SPENT

**10 hours**

September 13, 2014

## Table of Contents

<b>1</b>	<b>Matlab and Computational Assignment</b>	<b>2</b>
1.1	Conjugate Gradient Algorithm . . . . .	2
1.2	BFGS for Quadratic Problems . . . . .	3
1.3	Newtons Method . . . . .	4
1.4	Central Path . . . . .	5
1.5	Larger Linear Program . . . . .	6
1.6	Gradient, Conjugate Gradient, Newton and BFGS . . . . .	7
<b>2</b>	<b>Written Problems</b>	<b>8</b>
<b>A</b>	<b>Codes Printout</b>	<b>9</b>
A.1	Eq. 20 and its gradient . . . . .	9
A.2	Standard Gradient Descent with BackTracking Line Search . . . . .	10
A.3	Steepest Descent with BackTracking Line Search . . . . .	11
A.4	Cyclic Coordinate Descent . . . . .	12
A.5	Greedy Coordinate Descent . . . . .	13

## List of Figures

1	Conjugate Gradient Algorithm . . . . .	2
---	--	---

# 1 Matlab and Computational Assignment

## 1.1 Conjugate Gradient Algorithm

**Command** to be executed in matlab:

```
>> x_init = [1 1]'; alpha = 0.3; bta = 0.8;  
>> [x, iter, all_costs] = gd_btls(x_init, @func, @func_grad, alpha, bta);
```

**Dump**

```
Iter: 1, Cost: 5.292007e+00, Conv_Rate: 0.106142, gamma: 0.800000  
Iter: 44, Cost: 2.559267e+00, Conv_Rate: 1.000000, gamma: 0.000000  
Convergence reached!
```

**Minima**

```
x = [-0.3379, -0.0031], obj = 2.559267
```

**Plot**

Figure 1: Conjugate Gradient Algorithm

## 1.2 BFGS for Quadratic Problems

### 1.3 Newtons Method

## 1.4 Central Path

## 1.5 Larger Linear Program

## 1.6 Gradient, Conjugate Gradient, Newton and BFGS



## 2 Written Problems

## A Codes Printout

### A.1 Eq. 20 and its gradient

## A.2 Standard Gradient Descent with BackTracking Line Search

### A.3 Steepest Descent with BackTracking Line Search

## A.4 Cyclic Coordinate Descent

## A.5 Greedy Coordinate Descent