**Name: Your Name**

**Andrew ID: Your Andrew Id**

**Machine Learning for Text Mining**

**Homework 4 – Template**

1. **Statement of Assurance**

1. Did you receive any help whatsoever from anyone in solving this assignment? Yes / No.

If you answered ‘yes’, give full details? (e.g.“Jane explained to me what is asked in Question 3.4").

2. Did you give any help whatsoever to anyone in solving this assignment? Yes / No.

If you answered ‘yes’, give full details? (e.g. “I pointed Joe to section 2.3 to help him with Question 2").

3. Did you find or come across code that implements any part of this assignment? Yes / No.

If you answered ‘yes’, give full details? (e.g. book & page, URL & location within the page, etc)

1. **Writeup (40 pts)**
2. **[10 pts]** Gradient

(your prove here)

1. **[10 pts]** Hessian

(your prove here)

1. **[10 pts]** Optimality

(your prove here)

1. **[10 pts]** Algorithm Pseudo Code

(Outline the pseudo code of the optimization update procedure for mini-batch stochastic gradient method and Newton method)

1. **Experiments (20 pts)**

Plot the figures for **both** of two datasets and **both** the approaches

1. **[5 pts]** Relative function value difference versus training time
2. **[5 pts]** Gradient norm versus training time
3. **[5 pts]** Test set accuracies versus training time
4. **[5 pts]** Discuss the difference between mini-batch SGD and Newton method in terms of the three types of figures