Exercise 2: Online Learning **Cenying(Tracy) Yang**
SDS 385 Due Date: 9/*/2016
Prof. James Scott

Stochastic Gradient Descent for logistic regression

(A) **Solution**
See exercise 1.

(B) **Solution**

$$\begin{aligned} E\{ng_i(\beta)\} &= nE\{g_i(\beta)\} \\ &= nE[\frac{g_1(\beta)+g_2(\beta)+...+g_n(\beta)}{n}] \\ &= n*\frac{1}{n}\{E[g_1(\beta)]+E[g_2(\beta)]+...+E[g_n(\beta)]\} \\ &= \sum_{i=1}^{n} g_i(\beta) \\ &= \nabla l(\beta) \end{aligned} \tag{1}$$