HW2 Machine Learning 資四A 07156145 黃子豪

1. $E(\theta_0,\theta_1) = \frac{1}{2}[(\theta_0-3\theta_1-6)^2 + (\theta_0-\theta_1-4)^2 + (\theta_0-2)^2 + (\theta_0+\theta_1)^2 + (\theta_0+4\theta_1+8)^2]$

$= \frac{1}{2}[\theta_0^2+9\theta_1^2+36-6\theta_0\theta_1+36\theta_1-12\theta_0+\theta_0^2+\theta_1^2+16-2\theta_0\theta_1+8\theta_1-8\theta_0$
$+\theta_0^2+4+\theta_0^2+\theta_1^2+2\theta_0\theta_1+\theta_0^2+16\theta_1^2+64+8\theta_0\theta_1+64\theta_1+16\theta_0]$

$= \frac{1}{2}[5\theta_0^2+27\theta_1^2+120+2\theta_0\theta_1+108\theta_1-8\theta_0]$

$= \frac{5}{2}\theta_0^2+\theta_0\theta_1+\frac{27}{2}\theta_1^2-4\theta_0+54\theta_1+60$

$\therefore a=\frac{5}{2}\quad b=1\quad c=\frac{27}{2}\quad d=-4\quad e=54\quad f=60$

2. (1) $g(\theta_0)=E(\theta_0,2)$

$g(\theta_0)=\frac{5}{2}\theta_0^2-2\theta_0+222$

(2) $g'(\theta_0)=5\theta_0-2$

(3) Program

(4) $\theta_0 = 1-0.03\times g'(1)$

$=1-0.03\times 3 = 1-0.09$

$=0.91$ ※

3. $g(\theta_1)=E(1,\theta_1)$

(1) $g(\theta_1)=\frac{27}{2}\theta_1^2+55\theta_1+\frac{117}{2}$

(2) $g'(\theta_1)=27\theta_1+55$

(3) Program

(4) $\theta_1 = 2-0.03\times g'(2)$

$=2-0.03\times 109$

$=-1.27$

4.

x	y	$h_\theta(x)$	$h_\theta(x)-y$	$[h_\theta(x)-y]*x$
-3	6	-5	-11	33
-1	4	-1	-5	5
0	2	1	-1	0
1	0	3	3	3
4	-8	9	17	68
			3	109

(1) $\theta_0 = 1-0.03\times 3 = 0.91$

$\theta_1 = 2-0.03*109 = -1.27$

$\therefore h_\theta(x) = 0.91-1.27x$ ※

(2) program