**迴歸分析 作業1**

1. Problems (a) and (b) refer to the matrices ***A***, ***B***, and ***C*** defined as follows:

$A= $ $B=$ $C=$

a. Compute $A^{T}$($A$的轉置矩陣).

b. Which of the following operations are defined(下面哪些運算有定義)?

 ***C***+$ B^{T}$, ***B***+***C***, ***B***+$C^{T}$, ***AC***, ***CA***, ***B***-$ C^{T}$

c. In (b), evaluate the expressions that are defined(算出(b)中有定義的式子).

2. Let

***A*** =$\left[\begin{matrix}3&1\\1&2\end{matrix}\right] y=\left[\begin{matrix}5\\0\end{matrix}\right]$

 Find the 2 by 1 vector $\hat{β}=\left[\begin{matrix}\hat{β}\_{0}\\\hat{β}\_{1}\end{matrix}\right] $such that $A\hat{β}=y$.

3. Problems (a) through (d) refer to the matrices ***X*** and *y* defined as follows:

***X*** = $y=$

a. Find $X^{T}$***X***.

b. Find $X^{T}$*y*.

c. Find $\left(X^{T}X\right)^{-1}$(求$X^{T}$***X***的反矩陣).

d. Find the 2 by 1 vector $\hat{β}=\left[\begin{matrix}\hat{β}\_{0}\\\hat{β}\_{1}\end{matrix}\right]$ such that $X^{T}X\hat{β}=X^{T}y.$

4. For the function $Y\left(x\right)= 6x^{3}-5x+8,-6\leq x\leq 5$, find $Y(3)$ and $ Y(-2)$.

5. For the function $μ\_{Y}\left(x\_{1},x\_{2}\right)=3x\_{1}^{2}+6x\_{2}^{2}-2x\_{1}x\_{2}+4x\_{1}+3x\_{2}-9$, defined for all real values of $x\_{1}, x\_{2}$, find $μ\_{Y}\left(3, -1\right)$

6. For the function $μ\_{Y}\left(x\_{1},x\_{2},x\_{3}\right)=β\_{0}+β\_{1}x\_{1}+β\_{2}x\_{2}+β\_{3}x\_{3}$, defined for -3$\leq x\_{i}\leq 4$, $i=1,2,3$ , find $μ\_{Y}\left(1, 3, -2\right)$.

7. The function $f(x)$ is defined by $f\left(x\right)=6x^{2}+3x^{\frac{1}{2}}-9x+4 $for 4$<x<$49. Find the following.

(a) $f(4)$

(b) $f(16)/f(36)$

(c) $f\left(3\right)+16$

(d) $f\left(34\right)+f\left(13\right)$

(e) $f\left(64\right)$

8. Problems (a)-(c) refer to the function defined by

 $μ\_{Y}\left(x\_{1},x\_{2}\right)=β\_{0}+β\_{1}x\_{1}+β\_{2}x\_{2}^{3}$, for $-\infty <x\_{1}<\infty $, $-\infty <x\_{2}<\infty $.

(a) Compute $μ\_{Y}\left(6,1\right)$

(b) Compute $μ\_{Y}\left(15,-4\right)$

(c) Is the function $μ\_{Y}\left(x\_{1},x\_{2}\right)$ linear in $x\_{1}$? Is it linear in $x\_{2}$?

Is it simultaneously linear in$ x\_{1}$ and $x\_{2}$?