THE HONG KONG POLYTECHNIC UNIVERSITY
HONG KONG COMMUNITY COLLEGE

Subject Title : Advanced Linear Algebra **Subject Code** : CCN2236

Session : Semester One, 2014/15

Numerical Answers

Question A1

(b) $\operatorname{tr}(A) = -1$
$\det(A) = 1$

Question A2

(c) $\left\{(1,\ 2,\ 1)^T\right\}$

Question A3

(b) $\begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix} = -31\underline{v}_1 + 17\underline{v}_2 + 9\underline{v}_3$

Question A5

(a) $\left\{\left(\frac{1}{2},\ \frac{1}{2},\ \frac{1}{2},\ \frac{1}{2}\right)^T,\ \left(\frac{1}{2},\ -\frac{1}{2},\ -\frac{1}{2},\ \frac{1}{2}\right)^T,\ \left(\frac{1}{\sqrt{2}},\ 0,\ 0,\ -\frac{1}{\sqrt{2}}\right)^T\right\}$

(b) $(1,\ 4,\ 4,\ 7)^T$

Question A6

(b) $\hat{\beta}_0 = 5,\ \hat{\beta}_1 = \frac{76}{31}$ and $\hat{\beta}_2 = -\frac{112}{31}$

Question B1

(b) (i) $\left\{s\left(\frac{1}{4},\ \frac{1}{4},\ 1\right)^T : s \neq 0\right\}$

(ii) $\begin{pmatrix} \frac{11}{9} & \frac{11}{9} & \frac{8}{9} \\ \frac{11}{9} & \frac{11}{9} & \frac{8}{9} \\ \frac{8}{9} & \frac{8}{9} & \frac{50}{9} \end{pmatrix}$

Question B2

(a) A basis for $\text{Col}(B)$ is $\left\{(1,\ 2,\ -1,\ 0)^T, (2,\ 3,\ 1,\ 1)^T, (0,\ 2,\ -5,\ -2)^T\right\}$.

A basis for $N(B)$ is $\left\{(1,\ 1,\ 1,\ 0,\ 0)^T, (-2,\ -1,\ 0,\ 1,\ 1)^T\right\}$.

(c) (i) $c = -1$

(ii) There exists *no* value of c.