THE HONG KONG POLYTECHNIC UNIVERSITY

HONG KONG COMMUNITY COLLEGE

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

Session : Semester One, 2015/16

Numerical Answers

Question A1

(a) $\left\{s\left(1,-4,1\right)^T : s \neq 0\right\}$

(b) $\begin{pmatrix} 1 & -6 & 2 \\ -6 & 24 & -6 \\ 2 & -6 & 1 \end{pmatrix}$

Question A2

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

A basis for $\mathrm{N}\left(B\right)$ is $\left\{\left(5,-3,2,1\right)^T\right\}$.

Question A3

(b) $c = 3$

Question A4

(b) $\dim\left(S\right) = 2$

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

Question A5

(a) The possible eigenvalues of A are 0 and 1.

Question B1

(b) The eigenvalues of A are 2, 2 and 3.

(d) $\underline{u} = \left(2,-2,1\right)^T$

$\underline{v} = \left(-1,0,2\right)^T$

Question B2

(b) $\left\{\left(\frac{1}{2},\frac{1}{2},\frac{1}{2},-\frac{1}{2}\right)^T,\left(\frac{1}{2},-\frac{1}{2},\frac{1}{2},\frac{1}{2}\right)^T,\left(-\frac{1}{2},\frac{1}{2},\frac{1}{2},\frac{1}{2}\right)^T\right\}$

(c) $\left(-1,-\frac{3}{2},2\right)^T$

Question B3

(a) $m=3$