



Uva Wellassa University, Sri Lanka  
End Semester Examination – February/March 2012



MAT 305-3 Mathematical and Statistical Methods In Mineral Science

Duration: Three (03) hours

Part - A : Two (02) hours | Part - B : One (01) hour

Part - A

Total 04 Questions

Answer All questions

Answer Part A in a separate answer book.

01. a.) Let  $A$  be an  $n \times m$  matrix and let  $H = \{x \in R^m : Ax = 0\}$ . Show that  $H$  is a subspace of  $R^m$ .

b.) For what value(s) of  $\alpha$  will the vectors  $\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}, \begin{pmatrix} 2 \\ -1 \\ 4 \end{pmatrix}, \begin{pmatrix} 3 \\ \alpha \\ 4 \end{pmatrix}$  be linearly dependent?

c.) Describe the span of the vectors  $\underline{v}_1 = 1, \underline{v}_2 = x$  and  $\underline{v}_3 = x^3$

(20 Marks)

02. a.) Show that  $\underline{u} = (3, 0, 1, 0, 4, -1)$  and  $\underline{v} = (-2, 5, 0, 2, -3, -18)$  are orthogonal and verify that the Pythagorean Theorem holds.

b.) Show that  $\begin{pmatrix} 2 \\ -1 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}$  and  $\begin{pmatrix} 3 \\ 7 \\ -1 \end{pmatrix}$  is a basis of  $R^3$  and construct an orthogonal basis for  $R^3$ .

(20 Marks)