

## 314 '07-QUIZ 2

Name:-----

February 26, 2009

**1** < 10pts >

Find all values of  $c$  for which the matrix  $\mathbf{A}$  is singular, with

$$\mathbf{A} = \begin{pmatrix} 1-c & -2 & 2 \\ 0 & 2-c & 3 \\ 0 & 0 & 3-c \end{pmatrix}$$

**Solution**

**2** < 10pts >

A top secret message was encoded into the string

$$-1, 12, -14, -4, 15, -15, 9, 18, -30, 5, 5, -35$$

using the matrix

$$\mathbf{A} = \begin{pmatrix} 1 & -1 & 1 \\ 1 & 0 & 0 \\ -1 & 0 & -1 \end{pmatrix}$$

and the correspondence:

space = 0,  $A = 1, B = 2, \dots, Z = 26, (. , ? ! : *) = (27, \dots, 32)$ . What was the message?

**Solution**

**3**   < 10pts >

Consider the matrix

$$\mathbf{A} = \begin{pmatrix} 1 & 2 & -1 & 1 \\ -1 & -3 & 0 & -1 \\ 1 & 1 & -1 & 0 \\ 1 & 0 & -2 & 2 \end{pmatrix}$$

1. Use Gauss elimination to find the determinant  $\det \mathbf{A}$
2. What is the determinant of the inverse,  $\det \mathbf{A}^{-1}$ ?

**Solution**

**4** < 10pts >

Use Cramer's rule to solve the system

$$\begin{array}{rrcrcl} x_1 & - & x_2 & + & x_3 & = & 1 \\ -x_1 & + & 2x_2 & - & x_3 & = & 0 \\ 2x_1 & - & x_2 & + & 3x_3 & = & 0 \end{array}$$

**Solution**