| 1:30 p.m., 2007 4 14  | Final Examination                       |
|---|---|
| Course MATH 1210  | <b>Time</b> 2 hours                     |
| <b>Examination</b> Techniques of Classical and Linear Algebra   | <b>Examiner</b> R. S. D. Thomas         |
| Question Number 1   | Value 10 out of 65                      |
| (a) $S_n \equiv \sum_{r=1}^{3n} r^2 = n(3n+1)(6n+1)/2$<br>(b) Part (a) is not required, but as usual the precise summation makes $(3n+1)^2 + (3n+2)^2 + (3n+3)^2$ . | it easier to see that $S_{n+1} = S_n +$ |
| Question Number 2   | Value 10 out of 65                      |
| Linearly independent.   |   |
| Question Number 3   | Value 10 out of 65                      |
| There are no solutions because the equations are inconsistent.  |   |
| Question Number 4   | Value 15 out of 65                      |
| The eigenvalues and corresponding eigenvectors are  |   |
|   |   |

$$\left(1, \begin{bmatrix} -1\\ -1\\ 1 \end{bmatrix}\right), \left(2, \begin{bmatrix} 2\\ 1\\ 0 \end{bmatrix}\right).$$

Question Number 5

(a)

$$A^{-1} = \frac{1}{14} \begin{bmatrix} 1 & 2 & -1 \\ -1 & 1 & 2 \\ 2 & -1 & 1 \end{bmatrix}.$$

(b)

$$x = \frac{a+2b-c}{14}; y = \frac{-a+b+2c}{14}; z = \frac{2a-b+c}{14}.$$

Question Number 6

 $-1,\pm 2,\pm 2i.$ 

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Value 10 out of 65

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