Question Number 1 Value 10 out of 65

(a) $S_n \equiv \sum_{r=1}^{3n} r^2 = n(3n+1)(6n+1)/2$
(b) Part (a) is not required, but as usual the precise summation makes it easier to see that $S_{n+1} = S_n + (3n+1)^2 + (3n+2)^2 + (3n+3)^2$.

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 Value 10 out of 65

(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 Value 10 out of 65

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

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