620-151
Introduction to Biomedical Mathematics
Semester 1, 2005
Homework Assignment 1

Given out: Wednesday 9th March.
Due: Monday 21st March before 5pm.
Put in the assignment box of your tutor.
Please submit it with a Plagiarism coversheet.
Remember to check your answers!

1. Use strict Gauss-Jordan elimination to solve for \((x_1, x_2, x_3)\) in the system:

\[
\begin{align*}
2x_1 &- 6x_2 &- 14x_3 &= -28 \\
-2x_1 &+ 3x_2 &+ 8x_3 &= 16 \\
4x_1 &- 3x_2 &- 9x_3 &= -17
\end{align*}
\]

(4 marks)

2. Find all the solutions \((x, y, z)\) of the following under-determined system by first using Gauss Jordan elimination to simplify the system to a reduced form:

\[
\begin{align*}
2x &+ 18y &- 14z &= 42 \\
-2x &- 15y &+ 11z &= 33
\end{align*}
\]

(4 marks)

3. Find all the solutions \((x, y, z)\) of the following over-determined system by first using Gauss-Jordan elimination to simplify the system to a reduced form

\[
\begin{align*}
3x &- 6y &+ 60z &= -51 \\
6x &- 13y &+ 128z &= -110 \\
-3x &+ 7y &- 64z &= 55 \\
-6x &+ 9y &- 84z &= 66
\end{align*}
\]

(3 marks)

PLEASE TURN OVER
4. The following augmented matrix (corresponding to a system of linear equations) was obtained by Gauss-Jordan elimination. Does a solution exist? If so, write it down. If there is no solution, then please explain why.

\[
\begin{bmatrix}
1 & 7 & 0 & 3 & 0 & | & 2 \\
0 & 0 & 1 & -1 & 0 & | & 0 \\
0 & 0 & 0 & 0 & 1 & | & 3 \\
0 & 0 & 0 & 0 & 0 & | & 0 \\
0 & 0 & 0 & 0 & 0 & | & 0 \\
\end{bmatrix}
\]

(2 marks)

5. The following augmented matrix (corresponding to a system of linear equations) was obtained by Gauss-Jordan elimination. Does a solution exist? If so, write it down. If there is no solution, then please explain why.

\[
\begin{bmatrix}
1 & 0 & -3 & | & 7 \\
0 & 1 & 0 & | & -3 \\
0 & 0 & 0 & | & 8 \\
0 & 0 & 0 & | & 0 \\
\end{bmatrix}
\]

(2 marks)