Problem Set 1

Math 211-02, Fall 2015

Name:

Problem 1. Determine all solutions of the following system of linear equations by row-reducing the coefficient matrix:

a)
\[
\begin{align*}
\frac{1}{3}x_1 + 2x_2 - 6x_3 &= 0 \\
-4x_1 + 5x_3 &= 0 \\
-3x_1 + 6x_2 - 13x_3 &= 0 \\
-\frac{7}{3}x_1 + 2x_2 - \frac{8}{3}x_3 &= 0
\end{align*}
\]

b)
\[
\begin{align*}
x_1 - x_2 + 2x_3 &= 1 \\
2x_1 + 2x_3 &= 1 \\
x_1 - 3x_2 + 4x_3 &= 2
\end{align*}
\]

Problem 2. Show that the following system of linear equations has no solution:

\[
\begin{align*}
x_1 - 2x_2 + x_3 + 2x_4 &= 1 \\
x_1 + x_2 - x_3 + x_4 &= 2 \\
x_1 + 7x_2 - 5x_3 - x_4 &= 3
\end{align*}
\]

Problem 3. Determine a row-reduced matrix which is row-equivalent to

\[
A = \begin{pmatrix}
i & -(1+i) & 0 \\
1 & -2 & 1 \\
1 & 2i & -1
\end{pmatrix}
\]

Problem 4. Determine all \(b_1, b_2, b_3\) such that

\[
\begin{pmatrix}
3 & -1 & 2 \\
2 & 1 & 1 \\
5 & -5 & 4
\end{pmatrix}
\begin{pmatrix}
x_1 \\
x_2 \\
x_3
\end{pmatrix} = \begin{pmatrix}
b_1 \\
b_2 \\
b_3
\end{pmatrix}
\]

has a solution.