MS 120 Gauss-Jordan Extra Problems

1. Solve

$$\begin{cases} x_1 & + & 3x_2 & + & 2x_3 & + & 2x_4 & = & 3 \\ x_1 & + & x_2 & + & 3x_3 & & & = & 4 \\ 2x_1 & & & + & 2x_3 & - & 3x_4 & = & 4 \\ x_1 & - & 3x_2 & & & & & = & 1 \end{cases}$$

   a) Find the coefficient matrix.   b) Find the constant vector.   c) Find the augmented matrix.

Let A be the coefficient matrix.

```
julia> det(A)
50.0
```

Let Aug be the augmented matrix, in reduced row echelon form it is:

```
julia> rref(Aug)
4×5 Matrix{Float64}:
1.0   0.0   0.0   0.0   1.0
0.0   1.0   0.0   0.0   0.0
0.0   0.0   1.0   0.0   1.0
0.0   0.0   0.0   1.0   0.0
```

   (d) Is the system inconsistent/consistent/independent/dependent.

   (e) How many solutions does this system have?

   (f) What are they? If more than one also give two specific solutions.

2. Solve

$$\begin{cases} x_1 & + & 2x_2 & - & x_3 & + & x_4 & = & 2 \\ x_1 & + & 3x_2 & + & 4x_3 & + & x_4 & = & -4 \\ 2x_1 & + & 5x_2 & + & 2x_3 & + & 2x_4 & = & 1 \\ 2x_1 & + & 3x_2 & - & 6x_3 & + & 2x_4 & = & 2 \end{cases}$$

a) Find the coefficient matrix.   b) Find the constant vector.   c) Find the augmented matrix.

Let `A` be the coefficient matrix.

```
julia> det(A)
0.0
```

Let `Aug` be the augmented matrix, in reduced row echelon form it is:

```
julia> rref(Aug)
4×5 Matrix{Float64}:
1.0   0.0   0.0    1.0   0.0
0.0   1.0   0.0   -0.0   0.0
0.0   0.0   1.0    0.0   0.0
0.0   0.0   0.0    0.0   1.0
```

(d) Is the system inconsistent/consistent/independent/dependent.

(e) How many solutions does this system have?

(f) What are they? If more than one also give two specific solutions.

3. Solve

$$\begin{cases} x_1 & + & 3x_2 & + & 4x_3 & - & x_4 & = & 1 \\ x_1 & - & x_2 & - & 2x_3 & + & x_4 & = & 3 \\ x_1 & + & 2x_2 & + & 3x_3 & + & x_4 & = & 0 \\ 2x_1 & + & 2x_2 & + & 2x_3 & & & = & 4 \end{cases}$$

a) Find the coefficient matrix.   b) Find the constant vector.   c) Find the augmented matrix.

Let `A` be the coefficient matrix.

```
julia> det(A)
0.0
```

Let `Aug` be the augmented matrix, in reduced row echelon form it is:

```
julia> rref(Aug)
4×5 Matrix{Float64}:
1.0   0.0   0.0    2.0    1.0
0.0   1.0   0.0   -5.0    4.0
0.0   0.0   1.0    3.0   -3.0
0.0   0.0   0.0    0.0    0.0
```

(d) Is the system inconsistent/consistent/independent/dependent.

(e) How many solutions does this system have?

(f) What are they? If more than one also give two specific solutions.