## Math 1553 J1-J4 Quiz : Sections 1.1-1.2 Solutions

The quiz has a total of 10 points and you have 10 minutes. Read carefully.

- **1.** [2 points each] Give an example of ...
  - (1) ... a  $4 \times 5$  matrix in row echelon form that it is **not in** reduced row echelon form (and justify your answer).
  - (2) ... an augmented matrix in reduced row echelon form that corresponds to a system of 3 equations with 4 variables.

## Solution.

- (1) For an echelon form not to be reduced row echelon form either: there is a pivot that is not a coefficient 1 or there are some entries above a pivot that are not zeros. 1 point for giving a valid matrix and 1 point for stating which of the entries violate the definition of reduced echelon form.
- (2) Such augmented matrix will contain 3 rows, one for each equation, and 5 columns, one for each variable and the last one for the coefficients. *1 point for giving a* 3 × 5 *matrix and 1 point for it having a reduced row echelon form*.
- **2.** [3 points each] For the following augmented matrices determine how many free variables contains the corresponding system of equations, justify your answer. (*Hint:* the shape of the echelon form suffices to have the answer.)

(1)	( 1	-3	1	)		(0	1	-1	1
	$\left(-2\right)$	8	-2 )	J	(2)	1	0	2	0
			•			$\backslash 1$	1	1	1]

## Solution.

- No free variables, the solution is (x, y) = (1, 0) and the corresponding reduced row echelon form is (1 0 | 1 0).
  One free variable, the parametrized solution is (x, y, z) = (-2z, 1 + z, z) and
- (2) One free variable, the parametrized solution is (x, y, z) = (-2z, 1 + z, z) and the corresponding reduced echelon form is  $\begin{pmatrix} 1 & 0 & 2 & | & 0 \\ 0 & 1 & -1 & | & 1 \\ 0 & 0 & 0 & | & 0 \end{pmatrix}$

One point for stating the correct number of free variables. Two points for giving a correct sequence of row operations until having a row echelon form. Both the actual solution sets nor the reduced row echelon form is required this time.