Dawson College: **Linear Algebra** (COMPUTER SCIENCE): 201-NYC-05-S9: Fall 2022: **Quiz 1** name: Y. Lamontagne

Books, watches, notes or cell phones are **not** allowed. The **only** calculators allowed are the Sharp EL-531**. You **must** show all your work, the correct answer is worth 1 mark the remaining marks are given for the work.

Question 1. *(2 marks)* Determine whether the following statement is true or false. If the statement is false provide a counterexample. If the statement is true provide a proof of the statement.

If the number of equations in a linear system exceeds the number of unknowns, then the system must be inconsistent.

False, $\begin{array}{l} x=1 \\ 2x=2 \end{array}$ has more eqn. than var and has the solution $x=1$. Hence it is consistent

Question 2. *(3 marks)* Find all values of k for which the given augmented matrix corresponds to a consistent linear system.

$$\begin{bmatrix} 3 & -4 & k \\ -6 & 8 & 5 \end{bmatrix}$$

$$\begin{cases} 3x-4y=k \\ -6x+8y=5 \end{cases}$$

$$\begin{cases} y=\frac{3}{4}x-\frac{k}{4} \\ y=\frac{3}{4}x+\frac{5}{8} \end{cases}$$

$\therefore$ both lines are parallel since their slopes are equal. For the system to be consistant the y-intercept must be equal $\frac{-k}{4}=\frac{5}{8}$

$k=\frac{-5}{2}$

Question 2. *(3 marks)* Given the linear system $\begin{cases} x-\ \ y+\ \ z=b_1 \\ 2x-2y-2z=b_2 \\ x+3y-5z=b_3 \end{cases}$. Determine the b_i if the linear system has the particular solution $(3,-2,1)$.

The solution satisfies the equations $\therefore$ $b_1=3-(-2)+1=6$

$b_2=2(3)-2(-2)-2(1)=8$

$b_3=3+3(-2)-5(1)=-8$

Question 3. *(4 marks)* Find the solution set of the linear equation by using parameters as necessary

$$3x_1-5x_2+4x_3=7$$

Also find two particular solutions.

Let $\begin{array}{l} x_2=s \\ x_3=t \end{array}$ $s,t\in\mathbb{R}$

sub into eqn.

$3x_1-5s+4t=7$

$3x_1=7+5s-4t$

$x_1=\frac{7}{3}+\frac{5}{3}s-\frac{4}{3}t$

$\therefore$ $\begin{array}{l} x_1=\frac{7}{3}+\frac{5}{3}s-\frac{4}{3}t \\ x_2=s \\ x_3=t \end{array}$ $s,t\in\mathbb{R}$

Particular sol.

1) $s=t=0$

$\therefore (x_1,x_2,x_3)=(\frac{7}{3},0,0)$

2) $s=0,\ t=1$

$\therefore (x_1,x_2,x_3)=(1,0,1)$