Dawson College: **Linear Algebra**: 201-105-DW-S5: 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 equations form a linear system.

$$\begin{aligned} 3xy+x &= -4 \\ y+5z &= 1 \\ 6x+2z &= 3 \\ -x-y-z &= 4 \end{aligned}$$

Not a system of linear equations since the first equation is not linear. It is not linear since two variables are multiplied.

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

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

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

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

∴ 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 3. *(3 marks)* Determine whether the given vector $(3,1,1)$ is a solution of the linear system

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

Lets verify whether the solution satisfy each equation

$2(3)-4(1)-1=1$ ✓

$3-3(1)+1=1$ ✓

$3(3)-5(1)-3(1)=1$ ✓

∴ $(3,1,1)$ is a solution

Question 4. *(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 $x_2=s$, $x_3=t$ $\quad s,t\in\mathbb{R}$

sub into eqn

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

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

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

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

$x_2=s$ $\quad s,t\in\mathbb{R}$

$x_3=t$

Particular sol.

1) $s=t=0$

∴ $(x_1,x_2,x_3)=(\frac{7}{3},0,0)$

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

∴ $(x_1,x_2,x_3)=(1,0,1)$