

## Quiz 2

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

**Question 1.** §1.2 #20 (10 marks) Solve the given linear system by any method.

$$\begin{aligned} v + 3w - 2x &= 0 \\ 2u + v - 4w + 3x &= 0 \\ 2u + 3v + 2w - x &= 0 \\ -4u - 3v + 5w - 4x &= 0 \end{aligned}$$

$$\sim \begin{bmatrix} 0 & 1 & 3 & -2 & 0 \\ 2 & 1 & -4 & 3 & 0 \\ 2 & 3 & 2 & -1 & 0 \\ -4 & -3 & 5 & -4 & 0 \end{bmatrix}$$

$$\sim R_1 \leftrightarrow R_2 \begin{bmatrix} 2 & 1 & -4 & 3 & 0 \\ 0 & 1 & 3 & -2 & 0 \\ 2 & 3 & 2 & -1 & 0 \\ -4 & -3 & 5 & -4 & 0 \end{bmatrix}$$

$$\sim \begin{matrix} -R_1 + R_3 \rightarrow R_3 \\ 2R_1 + R_4 \rightarrow R_4 \end{matrix} \begin{bmatrix} 2 & 1 & -4 & 3 & 0 \\ 0 & 1 & 3 & -2 & 0 \\ 0 & 2 & 6 & -4 & 0 \\ 0 & -1 & -3 & 2 & 0 \end{bmatrix}$$

$$\sim \begin{matrix} -2R_2 + R_3 \rightarrow R_3 \\ R_3 + R_4 \rightarrow R_4 \end{matrix} \begin{bmatrix} 2 & 1 & -4 & 3 & 0 \\ 0 & 1 & 3 & -2 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\sim -R_2 + R_1 \rightarrow R_1 \begin{bmatrix} 2 & 0 & -7 & 5 & 0 \\ 0 & 1 & 3 & -2 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\sim \frac{1}{2}R_1 \begin{bmatrix} 1 & 0 & -7/2 & 5/2 & 0 \\ 0 & 1 & 3 & -2 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

Let

$$w = s$$

$$x = t$$

sub into

$$u - \frac{7}{2}s + \frac{5}{2}t = 0$$

$$v + 3s - 2t = 0$$

and we get

$$u - \frac{7}{2}s + \frac{5}{2}t = 0$$

$$v + 3s - 2t = 0$$

$$u = \frac{7}{2}s - \frac{5}{2}t$$

$$v = -3s + 2t$$

$$w = s$$

$$x = t$$

$\forall s, t \in \mathbb{R}$