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Quiz 7

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. *(5 marks)* §2.3 #31 Use Cramer's rule to solve for y without solving for the unknowns x, z, and w.

$$\begin{aligned} 4x + y + z + w &= 6 \\ 3x + 7y - z + w &= 1 \\ 7x + 3y - 5z + 8w &= -3 \\ x + y + z + 2w &= 3 \end{aligned}$$

$$A = \begin{bmatrix} 4 & 1 & 1 & 1 \\ 3 & 7 & -1 & 1 \\ 7 & 3 & -5 & 8 \\ 1 & 1 & 1 & 2 \end{bmatrix}$$

$$A_2 = \begin{bmatrix} 4 & 6 & 1 & 1 \\ 3 & 1 & -1 & 1 \\ 7 & -3 & -5 & 8 \\ 1 & 3 & 1 & 2 \end{bmatrix} \begin{matrix} -4R_4+R_1\to R_1 \\ \sim -3R_4+R_2\to R_2 \\ -7R_4+R_3\to R_3 \end{matrix} \begin{bmatrix} 0 & -6 & -3 & -7 \\ 0 & -8 & -4 & -5 \\ 0 & -24 & -12 & -6 \\ 1 & 3 & 1 & 2 \end{bmatrix}$$

$$\det A_2 = \det B = -\begin{vmatrix} -6 & -3 & -7 \\ -8 & -4 & -5 \\ -24 & -12 & -6 \end{vmatrix} = 0$$

since $C_1 = 2C_2$

$$\begin{matrix} -4R_4+R_1\to R_1 \\ \sim -3R_4+R_2\to R_2 \\ -7R_4+R_3\to R_3 \end{matrix} \begin{bmatrix} 0 & -3 & -3 & -7 \\ 0 & 4 & -4 & -5 \\ 0 & -4 & -12 & -6 \\ 1 & 1 & 1 & 2 \end{bmatrix} = B \qquad y = \frac{\det A_2}{\det A} = 0$$

$$\det B = -\begin{vmatrix} -3 & -3 & -7 \\ 4 & -4 & -5 \\ -4 & -12 & -6 \end{vmatrix} \begin{matrix} -6 & -6 \\ 4 & -8 \\ -4 & -12 \end{matrix}$$

$$= [-6(-8)(-6) - 6(-13)(-4) - 13(4)(-2) - (-13)(-8)(-4) + 6(-13)(-12) - (-6)(4)(-6)] = -424$$

$\det A$

Question 2. *(5 marks)* §3.1 #30 Show that there do not exists scalars c_1, c_2, and c_3 such that

$$c_1(1,0,1,0) + c_2(1,0,-2,1) + c_3(2,0,1,2) = (1,-2,2,3)$$

$$\left[\begin{array}{ccc|c} 1 & 1 & 2 & 1 \\ 0 & 0 & 0 & -2 \\ 1 & -2 & 1 & 2 \\ 0 & 1 & 2 & 3 \end{array}\right]$$

inconsistent

$\therefore$ no solution for C_1, C_2, C_3