MK 2660 Quiz #3 12/12

Name: The Prof

Please also write your name on the back of this sheet near the top.

① Describe two examples of vector spaces other than the real Euclidean spaces $\mathbb{R}^n$.

(4 pts) Possible answers:

- The set of all $m \times n$ matrices under usual matrix addition & scalar mult.
- The set of all complex numbers $a+bi$, where $(a+bi)+(c+di)=(a+c)+(b+d)i$ and $\alpha(a+bi)=\alpha+\alpha bi$
- The set of all continuous real-valued functions defined on the interval $[a,b]$, under usual addition & scalar mult. of functions.
- The set of all polynomials $a_0+a_1x+\cdots+a_nx^n$ of degree n, under usual addition & scalar mult. of polynomials.

② Use Cramer's Rule to find x_3:

$$\begin{aligned} x_1+x_2 &= 3 \\ 2x_1 - x_3 &= 0 \\ x_1 - x_2 + x_3 &= 1 \end{aligned}$$

(8 pts) $A = \begin{bmatrix} 1 & 1 & 0 \\ 2 & 0 & -1 \\ 1 & -1 & 1 \end{bmatrix}$

$$|A| = 1\cdot\begin{vmatrix} 0 & -1 \\ -1 & 1 \end{vmatrix} - 1\cdot\begin{vmatrix} 2 & -1 \\ 1 & 1 \end{vmatrix} = (0-1)-(2-(-1)) = -1-3 = -4$$

$$|A_3| = \begin{vmatrix} 1 & 1 & 3 \\ 2 & 0 & 0 \\ 1 & -1 & 1 \end{vmatrix} = -2\begin{vmatrix} 1 & 3 \\ -1 & 1 \end{vmatrix} = -2(1-(-3)) = -2(4) = -8$$

$$x_3 = \frac{|A_3|}{|A|} = \frac{-8}{-4} = 2$$