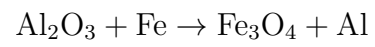


Math 251 X01  
Test Two

Time: 50 minutes  
Total: 25 marks

Name: \_\_\_\_\_

1. [4 marks] We want to balance:



Set up a system of equations. DO NOT SOLVE THE SYSTEM.

2. [4 marks]  $B$  is an invertible matrix. Solve for  $X$ :

$$(7I + BX)^T = A$$

3. [1 mark] The set of vectors  $\{\mathbf{a}, \mathbf{b}, \mathbf{c}\}$  is linearly independent. Is the set of vectors  $\{\mathbf{a}, \mathbf{b}\}$  linearly independent? Explain briefly.

4. [4 marks] Given  $A = \begin{bmatrix} -3 & 2 \\ 7 & 4 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & -4 \\ 4 & 1 \end{bmatrix}$ , and  $C = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ .  
Find  $(A - 3B)^T C^2$ .

5. [6 marks] Solve the system by finding  $A^{-1}$ .

$$\begin{aligned}x - 2y - 3z &= 15 \\4x - 7y - 16z &= 42 \\-3x + 6y + 10z &= -42\end{aligned}$$

6. [6 marks] Find  $k$  so that  $\mathbf{w} = \begin{bmatrix} 17 \\ -17 \\ k \end{bmatrix}$  is in  $\text{span}\left(\begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix}, \begin{bmatrix} 3 \\ -8 \\ 3 \end{bmatrix}\right)$ .