

Math 251 X02  
Test Two

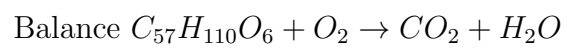
Time: 50 minutes  
Total: 16 marks

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

1. [3 marks]

Write  $\mathbf{w} = \begin{bmatrix} 13 \\ 76 \\ 74 \end{bmatrix}$  as a linear combination of  $\mathbf{u} = \begin{bmatrix} 1 \\ 5 \\ 4 \end{bmatrix}$  and  $\mathbf{v} = \begin{bmatrix} 2 \\ 11 \\ 10 \end{bmatrix}$ ,  
or show that it is impossible to do so.

2. [3 marks] Write down the system of equations you would use to solve the following problem. **Do not solve the system.**



3. [4 marks] Compute  $B^2 - AC^T$  where:

$$A = \begin{bmatrix} 1 & -1 \\ 3 & 6 \end{bmatrix}, B = \begin{bmatrix} 8 & 7 \\ 2 & -2 \end{bmatrix} \text{ and } C = \begin{bmatrix} 5 & -3 \\ 9 & 2 \end{bmatrix}$$

4. [3 marks] Write  $A = \begin{bmatrix} 1 & 3 \\ 0 & 2 \end{bmatrix}$  as a product of elementary matrices.

5. [3 marks] Find a  $2 \times 2$  matrix  $A$  such that:

a)  $A^2 = I$  but  $A \neq I$

b)  $A \begin{bmatrix} 1 & 2 \\ 2 & 5 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$