

QUESTION
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1. (10 marks) (10 marks) (10 marks)

Consider the following system of linear equations in three variables:

$$\begin{cases} x + 2y + 3z = 1 \\ 2x + 3y + 4z = 2 \\ 3x + 4y + 5z = 3 \end{cases}$$

Use Gaussian elimination to solve the system.

Write down the solution set.

What is the rank of the coefficient matrix?

What is the rank of the augmented matrix?

What is the dimension of the solution set?

What is the dimension of the null space?

What is the dimension of the column space?

What is the dimension of the row space?

What is the dimension of the left null space?

What is the dimension of the right null space?

What is the dimension of the fundamental system?

What is the dimension of the orthogonal complement?

What is the dimension of the orthogonal complement of the null space?

What is the dimension of the orthogonal complement of the column space?

What is the dimension of the orthogonal complement of the row space?

What is the dimension of the orthogonal complement of the left null space?

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Handwritten notes on a page from a notebook, detailing a list of items and their prices.

Handwritten list of items and prices:

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DECLARATION OF THE PRESIDENT OF THE UNITED STATES

I, **Barack Obama**, do hereby declare that I am a natural born citizen of the United States of America, and I am qualified to hold the office of President of the United States.

I, **Michelle Obama**, do hereby declare that I am a natural born citizen of the United States of America, and I am qualified to hold the office of First Lady of the United States.

I, **Joe Biden**, do hereby declare that I am a natural born citizen of the United States of America, and I am qualified to hold the office of Vice President of the United States.

I, **Kamala Harris**, do hereby declare that I am a natural born citizen of the United States of America, and I am qualified to hold the office of Vice President of the United States.

I, **Donald Trump**, do hereby declare that I am a natural born citizen of the United States of America, and I am qualified to hold the office of President of the United States.

I, **Eric Trump**, do hereby declare that I am a natural born citizen of the United States of America, and I am qualified to hold the office of Vice President of the United States.

I, **Donald Trump Jr.**, do hereby declare that I am a natural born citizen of the United States of America, and I am qualified to hold the office of Vice President of the United States.

I, **Donald Trump III**, do hereby declare that I am a natural born citizen of the United States of America, and I am qualified to hold the office of Vice President of the United States.

I, **Donald Trump IV**, do hereby declare that I am a natural born citizen of the United States of America, and I am qualified to hold the office of Vice President of the United States.

I, **Donald Trump V**, do hereby declare that I am a natural born citizen of the United States of America, and I am qualified to hold the office of Vice President of the United States.