

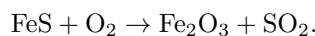
Name: \_\_\_\_\_

## Quiz 2

Use of the textbook or notes is not allowed. No electronic devices or calculators are allowed. To get credit, you must show **ALL** of your work, unless otherwise stated in the problem. Please do not cheat. *"The first and worst of all frauds is to cheat one's self."*

Read each question carefully and follow the directions stated in each question.

1. (4 points) Balance the given chemical equation by setting up and then solving a system of linear equations.



Key:  $4\text{FeS} + 7\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3 + 4\text{SO}_2.$

2. Consider the collection of vectors  $A = \left\{ \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} \right\}.$

- (a) (2 points) Does  $\text{span } A = \mathbb{R}^3$ ? Justify your answer. Yes, since row reducing  $A$  yields a pivot in every row, so by the theorem in class, columns of  $A$  span the space they live in.

- (b) (4 points) Exhibit a way to build the vector  $\begin{bmatrix} 2 \\ 1 \\ 2 \end{bmatrix}$  out of the columns of  $A$ , if possible. (Guessing and checking is not allowed.)  $-1$  times the first column,  $-1$  times the second column, and  $3$  times the third column of  $A$  builds the desired vector.

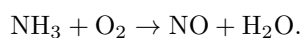
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Read each question carefully and follow the directions stated in each question.

1. Balance the given chemical equation by setting up and then solving a system of linear equations.



Key:  $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}.$

2. Consider the collection of vectors  $A = \left\{ \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} \right\}.$

(a) (2 points) Does  $\text{span } A = \mathbb{R}^3$ ? Justify your answer. Yes, since row reducing  $A$  yields a pivot in every row, so by the theorem in class, columns of  $A$  span the space they live in.

- (b) (4 points) Exhibit a way to build the vector  $\begin{bmatrix} 1 \\ 3 \\ 1 \end{bmatrix}$  out of the columns of  $A$ , if possible. (Guessing and checking is not allowed.)  $-2$  times the first column, 3 times the second column, and 0 times the third column of  $A$  builds the desired vector.

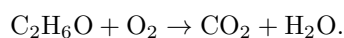
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Read each question carefully and follow the directions stated in each question.

1. Balance the given chemical equation by setting up and then solving a system of linear equations.



Key:  $\text{C}_2\text{H}_6\text{O} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}.$

2. Consider the collection of vectors  $A = \left\{ \begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix} \right\}.$

(a) (2 points) Does  $\text{span } A = \mathbb{R}^3$ ? Justify your answer. Yes, since row reducing  $A$  yields a pivot in every row, so by the theorem in class, columns of  $A$  span the space they live in.

(b) (4 points) Exhibit a way to build the vector  $\begin{bmatrix} 7 \\ 7 \\ 7 \end{bmatrix}$  out of the columns of  $A$ , if possible. (Guessing and checking is not allowed.) 2 times the first column, 3 times the second column, and 1 times the third column of  $A$  builds the desired vector.