Solving linear equations using the inverse matrix

TOTAL POINTS 14

 You go to the shops on Monday and buy 1 apple. 1 banana, and 1 carrot: the whole transaction totals €15. On Tuesday you buy 3 apples, 2 bananas, 1 carrot, all for €28. Then on Wednesday 2 apples, 1 banana, 2 carrots, for €3? 1/1 point

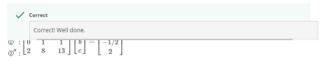
Construct a matrix and vector for this linear algebra system. That is, for

$$A \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} s_{\text{Mon}} \\ s_{\text{Tue}} \\ s_{\text{Wed}} \end{bmatrix}$$

Where a,b,c, are the prices of apples, bananas, and carrots. And each s is the total for that day.

Fill in the components of A and ${\bf s}.$





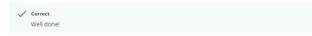
What steps did we take?

- The new second row, @'' is the old second row minus two times the old first row, i.e., @'' = [@' 2@'].
- $\bigcirc \ \ \, \text{The new second row, } @'' \text{ is the old second row minus three, i.e., } @'' = @' 3.$
- $\bigcirc \ \ \, \text{The new second row, } @'' \text{ is the old second row divided by four minus the old first row, i.e., } @'' = @'/4 @'.$



$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 9/4 \\ -1/2 \\ -1/4 \end{bmatrix}$$





5. Let's return to the apples and bananas from Question 1.

3/3 points

Take your answer to Question 1 and convert the system to echelon form. I.e.,

3/3 points

What is the price of apples, bananas, and carrots?



8. In practice, for larger systems, one never solves a linear system by hand as there are software packages that can do this for you - such as numpy in Python.

1/1 point

Use this code block to see *numpy* invert a matrix.

4

You can try to invert any matrix you like. Try it out on your answers to the previous question

linear algebra routines are quicker to solve the system for each case

