Linear dependency of a set of vectors

TOTAL POINTS 6

1.Question 1

In the lecture videos you saw that vectors are linearly dependent if it is possible to write one vector as a linear combination of the others. For example, the vectors a, b and c are linearly dependent if a = q_1b + q_2 c where q_1 and q_2 are scalars.

Are the following vectors linearly dependent?

a=[1 1] and
b=[2 2].

- (•) Yes
- ( ) No

1 / 1 point

2.Question 2

We say that two vectors are linearly independent if they are *not* linearly dependent, that is, we cannot write one of the vectors as a linear combination of the others. Be careful not to mix the two definitions up!

Are the following vectors linearly independent?

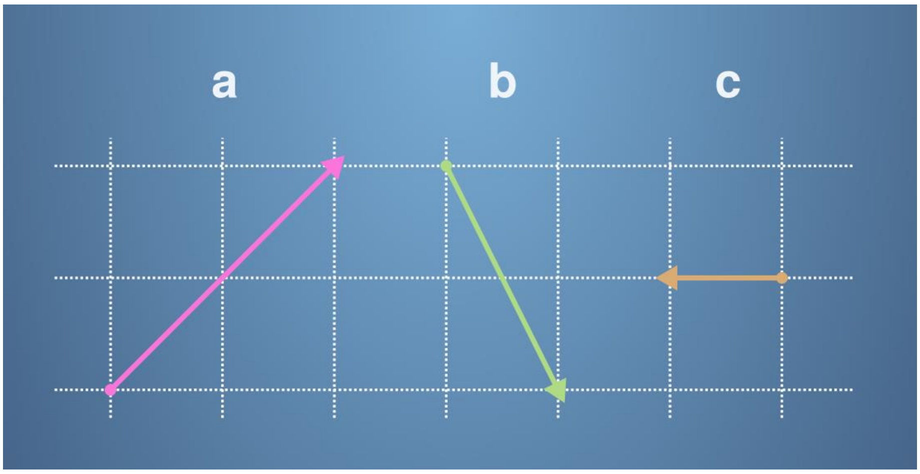
a=[1 1] and
b=[2 1].

- (•) Yes
- ( ) No

1 / 1 point

3.Question 3

We also saw in the lectures that three vectors that lie in the same two dimensional plane must be linearly dependent. This tells us that a, b and c are linearly dependent in the following diagram:



What are the values of *q*1 and *q*2 that allow us to write a = *q*1b + *q*2c? Put your answer in the following codeblock:

```
# Assign the correct values for q1 and q2 to write a as a linear combination of
  b and c
q1 = -1
q2 = -3
```

RunReset

-3

1 / 1 point

4.Question 4

In fact, an *n*-dimensional space can have as many as *n* linearly independent vectors. The following three vectors are three dimensional, which means that we must check if they are linearly dependent or independent.

Are the following vectors linearly independent?

$a=\begin{bmatrix}1\\0\\0\end{bmatrix}$, $b=\begin{bmatrix}1\\1\\0\end{bmatrix}$ and $c=\begin{bmatrix}1\\0\\1\end{bmatrix}$

- (•) Yes
- ( ) No

1 / 1 point

5.Question 5

Are the following vectors linearly independent?

$a=\begin{bmatrix}1\\0\\1\end{bmatrix}$,

$b=\begin{bmatrix}2\\-1\\1\end{bmatrix}$ and
$c=\begin{bmatrix}-3\\1\\-2\end{bmatrix}$.

- ( ) Yes
- (•) No

1 / 1 point

6.Question 6
The following set of vectors cannot be used as a basis for a three dimensional space. Why?

$a=\begin{bmatrix}1\\2\\0\end{bmatrix}$,
$b=\begin{bmatrix}-2\\1\\3\end{bmatrix}$ and
$c=\begin{bmatrix}4\\3\\-3\end{bmatrix}$.

- [ ] The vectors are linearly independent
- [ ] There are too many vectors for a three dimensional basis
- [x] The vectors are not linearly independent
- [x] The vectors do not span three dimensional space