4.13B Matrices as Functions

Write your questions and thoughts here!

Composition of Two Linear Transformations

You apply one transformation and then the other one.

Transformation *T* and *U* denoted by $T(U(\vec{v}))$ means we apply *U* then *T*.

If Transformation *T* is associated with matrix *A*, and transformation *U* is associated with matrix *B*, then the product of the matrices is the composition of the overall transformation.

$$T(U(\vec{v})) = AB$$

Ex 1: Matrix A and B represent the transformations T and U respectively. Find the associated matrix for the composition of the function and then find $T(U(\vec{v}))$

$A = \begin{bmatrix} 3 & 2 \\ 0 & 1 \end{bmatrix}, B = \begin{bmatrix} 4 & 6 \\ -2 & 3 \end{bmatrix}, \vec{v} = \langle 4, 3 \rangle$

Ex 2: Find the associated matrix for the composition of the function and then find $U(T(\vec{v}))$.

$A = \begin{bmatrix} 3 & 2 \\ 0 & 1 \end{bmatrix}, B = \begin{bmatrix} 4 & 6 \\ -2 & 3 \end{bmatrix}, \vec{v} = \langle 4, 3 \rangle$

Ex 3: Find the associated matrix to the composition of transformations with reflection across the x-axis and a rotation of $\frac{\pi}{2}$.

Write your questions

Use Inverses with Linear Transformations

Suppose T is a linear transformation represented by the matrix $A = \begin{bmatrix} 1 & 1 \\ 4 & 2 \end{bmatrix}$. Given $\vec{v} = \langle 10,4 \rangle$ find the vector, $\vec{u}$ that was transformed by A to get $\vec{v}$.

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AP Precalculus

4.13B Practice

Directions: Matrix A and B represent the transformations T and U respectively. Find the associated matrix for the composition of the function and then find the vector after the given transformation.

1) Find the associated matrix and $T(U(\vec{v}))$. $A = \begin{bmatrix} -2 & -1 \\ 3 & 5 \end{bmatrix}, B = \begin{bmatrix} 0 & 2 \\ -4 & 1 \end{bmatrix}, \vec{v} = \langle 2,-5 \rangle$	2) Find the associated matrix and $U(T(\vec{v}))$. $A = \begin{bmatrix} -2 & -1 \\ 3 & 5 \end{bmatrix}, B = \begin{bmatrix} 0 & 2 \\ -4 & 1 \end{bmatrix}, \vec{v} = \langle 2,-5 \rangle$
3) Find the associated matrix and $T(U(\vec{v}))$. $A = \begin{bmatrix} 4 & -2 \\ -4 & 3 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ 3 & 1 \end{bmatrix}, \vec{v} = \langle -3,-4 \rangle$	4) Find the associated matrix and $U(T(\vec{v}))$. $A = \begin{bmatrix} 4 & -2 \\ -4 & 3 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ 3 & 1 \end{bmatrix}, \vec{v} = \langle -3,-4 \rangle$

Directions: Find the associated matrix to the composition of transformations.	
5) Reflect across the y-axis and a rotation of π radians counterclockwise.	6) Rotation of $\frac{\pi}{2}$ radians counterclockwise and a horizontal and vertical dilation of 4 units.

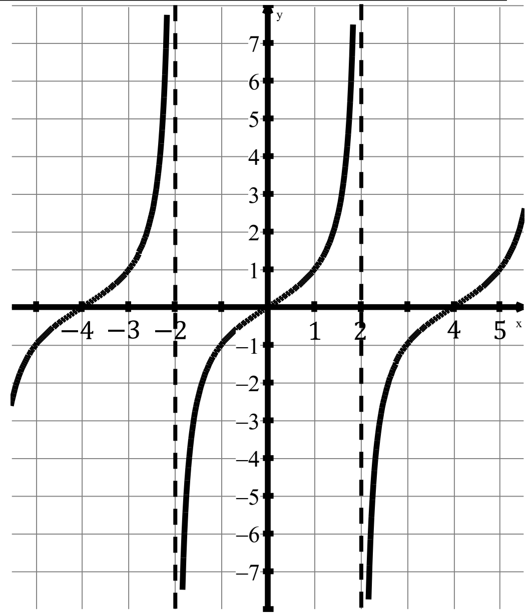
Directions: Given $\vec{v}$ find the vector $\vec{u}$, that was transformed by matrix A to get $\vec{v}$.

7) $\vec{v} = \langle -4,2 \rangle$ and $A = \begin{bmatrix} 3 & 2 \\ 2 & 2 \end{bmatrix}$.

8) $\vec{v} = \langle 9,-3 \rangle$ and $A = \begin{bmatrix} 6 & -5 \\ 3 & -3 \end{bmatrix}$.

9) $\vec{v} = \langle -2, -3 \rangle$ and $A = \begin{bmatrix} -4 & -3 \\ -3 & -2 \end{bmatrix}$.

10) (3.8) The graph of $f(x) = \tan(bx)$, where b is a constant, is shown in the xy-plane. What is the value of b?



Graph of f

(A) 4

(B) 2

(C) $\frac{\pi}{2}$

(D) $\frac{\pi}{4}$

11) (3.10) The function g is given by $g(x) = 2\cos(x)$. What are all solutions $g(x) = \sqrt{3}$?

(A) $x = \frac{\pi}{6} + 2\pi k$ and $\frac{5\pi}{6} + 2\pi k$, where k is any integer

(B) $x = \pm\frac{\pi}{6} + 2\pi k$, where k is any integer

(C) $x = \frac{\pi}{3} + 2\pi k$ and $\frac{2\pi}{3} + 2\pi k$, where k is any integer

(D) $x = \pm\frac{\pi}{3} + 2\pi k$, where k is any integer

12) (3.13) The point A has polar coordinates $\left(4, \frac{7\pi}{6}\right)$. Which of the following also gives the location of point A in polar coordinates?

(A) $\left(4, -\frac{11\pi}{6}\right)$

(B) $\left(4, -\frac{5\pi}{6}\right)$

(C) $\left(-4, -\frac{\pi}{6}\right)$

(D) $\left(-4, -\frac{5\pi}{6}\right)$