Practice test

Hứa Hoàng Nguyên

Question 1

0/1 pt 999 998

In $\mathbb{R}^3$ given the linear mapping f be the orthogonal projection onto the plane $1x + 6y + 2z = 0$. Find the image of the triangle with vertices $A(-9, 4, 0),\ B(-3, 9, -8), C(-10, 6, 5)$.

The standard matrix of the f is

A_f =

$$\begin{bmatrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix}$$

(Input results as fraction)

Input the answer as the coordinates of image A'B'C'

A'=

$$\begin{bmatrix} \square & \square & \square \end{bmatrix}$$

(Round the results to 4 decimal digits.)

B'=

$$\begin{bmatrix} \square & \square & \square \end{bmatrix}$$

(Round the results to 4 decimal digits.)

C'=

$$\begin{bmatrix} \square & \square & \square \end{bmatrix}$$

(Round the results to 4 decimal digits.)

Question 2

0/1 pt 999 998

Given the linear mapping in $\mathbb{R}^2$ be the rotation about the origin an angle $\frac{\pi}{3}$ by countercclockwise direction. Find the image of the vecto $\vec{u} = (-1, -1)$

$f(\vec{u})$ =

[☐ ☐]

(Round the result to 4 decimal digits)

Question 3 0/1 pt 999 998

In $\mathbb{R}^3$ given the linear mapping be the reflection through the plane $8x + 1y + 2z = 0$. Find the image of the triangle with vertices $A(-4, 9, 10),\ B(-6, -1, 4), C(5, 2, -5)$. Round the results to 4 decimal digits.

Input the answer as the coordinates of image A'B'C'

A'=

[☐ ☐ ☐]

B'=

[☐ ☐ ☐]

C'=

[☐ ☐ ☐]

Question 4 0/1 pt 999 998

In $\mathbb{R}^2$ given the linear mapping be the reflection through the line $5x + -1y = 0$. Find the image of the triangle with vertices $A(-7, -8),\ B(-6, 8), C(-2, -10)$.

The matrix representation A=

$$\begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix}$$

Input the answer as the coordinates of image A'B'C' .

A'=

$$\begin{bmatrix} \square & \square \end{bmatrix}$$

B'=

$$\begin{bmatrix} \square & \square \end{bmatrix}$$

C'=

$$\begin{bmatrix} \square & \square \end{bmatrix}$$

Question 5 0/1 pt 999 998

In $\mathbb{R}^3$ given the linear mapping $f: \mathbb{R}^3 \to \mathbb{R}^3$ such that $f(1, -2, 0) = (-3, -10, 2)$, $f(0, 1, 0) = (10, -9, -3)$, $f(-3, 2, 1) = (9, 7, 6)$.

Find the matrix representation in the basis $E = \{(1, 1, 2), (1, 2, 1), (1, 1, 1)\}$.

A_E =

$$\begin{bmatrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix}$$

Given that $x = (8, 2, -10)$. Find $[f(x)]_E$

$[f(x)]_E$ =

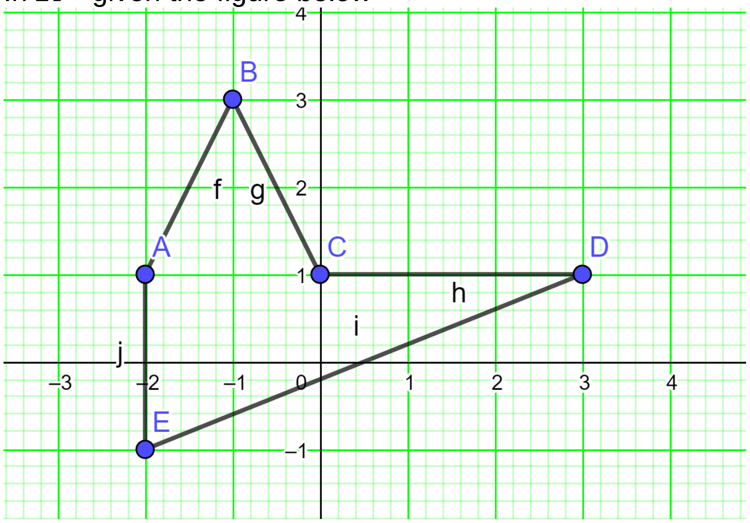
$$\begin{bmatrix} \square \\ \square \\ \square \end{bmatrix}$$

Find the dimension of Kerf

dim Kerf= $\square$

Question 6 0/1 pt 999 998

In $\mathbb{R}^2$ given the figure below



with $A(-2,1), B(-1,3), C(0,1), D(3,1), E(-2,\ -1)$. Find the image of this figure of the linear transformation f by performing two successive linear transformations f_1, f_2 , where f_1 is the rotation clockwise about origin angle $5\frac{\pi}{6}$ and f_2 is the reflection across the line $-3x-2y=0$.

The standard matrix of f (round the result to 2 decimal digits)=

The matrix image =

Question 7 0/1 pt 999 998

Given E be a basis in $\mathbb{R}^2$, two vectors u_1, u_2, $[u_1]_E = [-1 \quad -5]^T$, $[u_2]_E = [6 \quad 6]^T$. Let f be a linear mapping $\mathbb{R}^2 \to \mathbb{R}^2$, and $[f(u_1)]_E = [-2 \quad 2]^T$, $[f(u_2)]_E = [-2 \quad 2]^T$.

a) Find the matrix representation of f with respect to the basis E. (Hint: use the formula $[f(u)]_E = A_E[u]_E$)

$A_E =$

$$\begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix}$$

b) If $E = \left\{(1, 3)^T, (8, -3)^T\right\}$, find the $f\left(\begin{bmatrix} -2 \\ -6 \end{bmatrix}\right)$.

$f\left(\begin{bmatrix} -2 \\ -6 \end{bmatrix}\right) =$

$$\begin{bmatrix} \square \\ \square \end{bmatrix}$$

Question 8 0/1 pt 999 998

Suppose that the oldest age attained by the females in a certain animal population is 15 years and we divide the population into three age classes with equal durations of five years. Let the Leslie matrix for this population be $\begin{bmatrix} 0 & 4 & 3 \\ 0.25 & 0 & 0 \\ 0 & 0.33 & 0 \end{bmatrix}$. The vector of age distribution now is $\begin{bmatrix} 23 \\ 17 \\ 18 \end{bmatrix}$.

The probability for a 4-year-old animal to survive to the age of 8 is ______ (%).

The number of animals whose age from 5 <= age <= 10 after 2 years: ______

Question 9 0/1 pt 999 998

Given the equation $AX + B^T = 5X + 3C$, where $A = \begin{bmatrix} 6 & 0 & 0 \\ -8 & 6 & 0 \\ 3 & 0 & 6 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 8 & 7 \\ 5 & -7 & 6 \\ -3 & 9 & 4 \end{bmatrix}$, $C = \begin{bmatrix} 4 & -9 & 1 \\ -7 & 10 & 7 \\ 8 & -3 & -2 \end{bmatrix}$.

Find X.

X=

Question 10 0/1 pt 999 998

Two competing companies(A,B) offer network service to a population of 109557 consumers. During any month, company A consumer has a 20% probality of switching to company B and a 5% probability of not using service of either company. A consumer of company B has a 15% probability of switching to company A and a 10% probability of not using service. A nonuser has a 15% probabibility of purchasing company B and 10% using service of A. How many people will be in each group after 3 months? Knowing that at this month, there are 18827 subscribers of A, 28948 subscribers of B.

Matrix transition=

$X^{(3)}$ =

Question 11 0/1 pt 999 998

A machine can be either working or broken down on any given day. If it is working, it will break down in the next day with probability 5 %, and will continue working with probability 95 %. If it breaks down on a given day, it will be repaired and be working in the next day with probability 80%, and will continue to be broken down with probability 20%. Given that the probability that the machine works today is 81% .

1) The matrix transition in this model is: A=

$$\begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix}$$

2) The probability of working state on tomorrow of the machine is:

$$\begin{bmatrix} \square \\ \square \end{bmatrix}$$

(The result in percentage form)

3) The probability of working state after 4 days of the machine is

$$\begin{bmatrix} \square \\ \square \end{bmatrix}$$

Question 12 0/1 pt 999 998

Find the matrix X that satisfies the matrix equation $XB + 3XA^T = C$,

where $A = \begin{bmatrix} -1 & 1 \\ -3 & -3 \end{bmatrix}$, $B = \begin{bmatrix} 7 & 12 \\ -6 & 7 \end{bmatrix}$, $C = \begin{bmatrix} -2 & 3 \\ -1 & 5 \end{bmatrix}$.

Answer:

$X =$

$$\begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix}$$

Question 13 0/1 pt 999 998

In $\mathbf{R}^3$ given inner product: $< x, y > \ = 4x_1y_1 + 5x_2y_2 + 4x_3y_3 - 2x_2y_3 - 2x_3y_2$ and a subspace$F = span\{(1,2,1),(2,\ -1,4),(\ -18,\ -6,\ -30)\}$.

Find $< x, y >$ if $x = (\ -6,\ -7,4), y = (\ -5,\ -6,\ -9)$

Find the dimension and a basis of $F^\perp$.

$< x, y >$ =

Upload your hand writing solution for the second question here.

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Question 14 0/1 pt 999 998

In $\mathbb{R}^3$, given inner product:

$$< x, y > \ = 4x_1y_1 + 2x_2y_2 + 8x_3y_3 - x_1y_3 - x_3y_1$$

Given $F = span\{(1,3,5),(2,5,7),(0,1,3),(3,8,12)\}$. Find orthogonal projection of vector x=(-4,4,4) onto F. Round the result to 2 decimal digits.

$Proj_F x =$

$$\begin{bmatrix} \square \\ \square \\ \square \end{bmatrix}$$

Find the dimension and a basis of $F^\perp$ (Upload your hand writing solution).

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Question 15 0/1 pt 999 998

Given inner product in $\mathbb{R}^3$

$$< x, y > \; = 4x_1y_1 + 2x_2y_2 + 8x_3y_3 - x_1y_3 - x_3y_1$$

Given the subspace $F = \left\{x = (x_1, x_2, x_3) \in \mathbb{R}^3, x_1 - x_2 + 3x_3 = 0\right\}$.

Find orthogonal projection of vector x=(5,5,2) onto F. Round the result to 2 decimal digits.

$$Proj_F x = \begin{bmatrix} \square \\ \square \\ \square \end{bmatrix}$$

Question 16 0/1 pt 999 998

In $\mathbb{R}^3$, given the inner product:

$< x, y > \; = 4x_1y_1 + 2x_2y_2 + 8x_3y_3 - x_1y_3 - x_3y_1$.

Vector $x = (6, 5, 9), y = (- 5, \; - 7, \; - 6)$. Find the distace between x, y. Round to 4 decimal digits.

$d(x, y) =$

Question 17 0/1 pt 999 998

In `\RR^3` , given inner product:

`lt x, y gt =4x_1y_1+2x_2y_2+8x_3y_3-x_1y_3-x_3y_1`

Vector `x=(0,-6,-7),y=(2,-4,3)`

Find `ltx ,ygt` , the distance between x, y and the angel between x and y.

<x, y> = .

Distance= (Round the result to 2 decgimal digits)

Angle= (Round the result to 2 decimal digits)

Question 18 0/1 pt 999 998

Find the eigenvalues of the matrix `[(5,-10),(5,-10)]`.

The eigenvalues are `lambda = ` [ ] (enter the eigenvalues, separated by commas)

Question Help: Video Written Example

Question 19 0/1 pt 999 998

In a city , there are 3 supermarkets A; B and C. In
this month there are `52743` householders going to A , `46900` going to B and `30355` going to C.
The transition after each month as:

`A -gt B: 7.5 %, A -gt C: 2.5 % , B -gt A: 1.5 %, B-gtC: 5 %, C-gtA:10 %, C-gtB: 7.5 %` .

What is the matrix transition P?

P=

How many householders that go to A, B and C after 1 month?

The number of houslders going to A,B,C (Round the answer to the nearest integer)=

.

Find the number of houseloders in each group after 1 year?

The eigenvalues of P (input the answer from biggest to smallest value of eigenvalues)=

The number of housholders A,B,C after 1 year (Round the answer to the nearest integer)=

Question 20 0/1 pt 999 998

Given the matrix `A=[[-9,2,-1],[-6,-2,9],[-4,4,m]]` . Find m such that `\lambda=8` is an eigvenlue of A.

Question 21 0/1 pt 999 998

Given matrix A= `[(-23,66,30),(-24,67,30),(34,-94,m)]` , find m such that vector X=`(3,2,-2)` is an eigenvector of A.

m=

Question 22 0/1 pt 999 998

Given two square matrices size `2 ` `A` and `B ` such that` |A|=-4, |B|=3` . Applying 2 successive row operations on `A` to obtain `A_1 ` as the following: `r_1 harr r_2,` (interchanging ` r_1` and `r_2`), ` r_2 -> -10 r_2+3r_3` (replacing `r_2` by multiplying row 2 by `-10` and adding to row 3 time 3). Compute `\|2 A_1B^{-1}\|` .

Answer= .

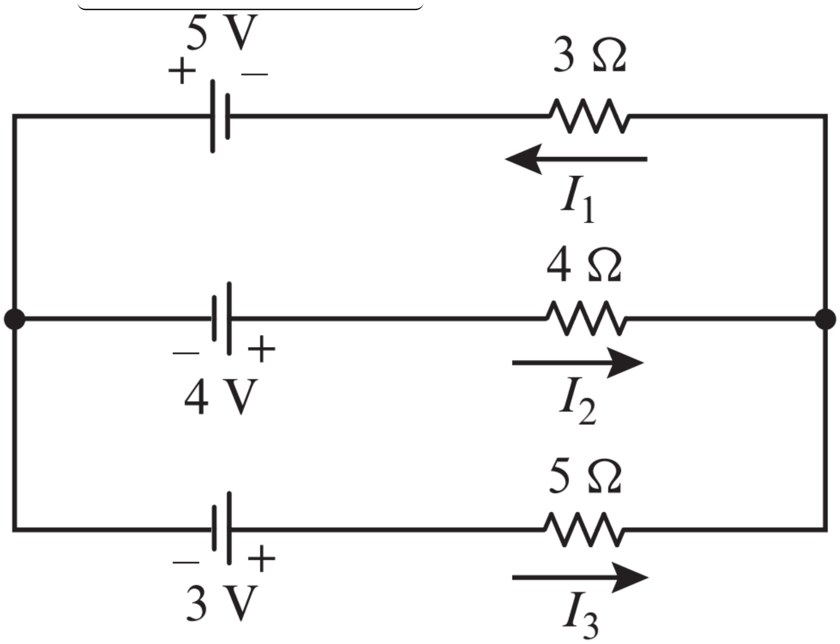
Question 23 0/1 pt 999 998

Find all the unknown current on the circuit.(Round the result to 2 decimal digits).

`I_1` =

`I_2` =

`I_3` =



Question 24 0/1 pt 999 998

In `\RR^2 ` given the linear mapping `f` be the reflection through the line `-6 x+8 y=0` and the triangle `ABC` . We know that `f(ABC)=A'B'C'` , where `A'(6,10),` `B'(-3,-6)` , `C'(-6,3)` . Find the coordinates of the points `A, B, C.`

The standard matrix representation A of f is =

$$\begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix}$$

Input the answer as the coordinates of `A,\, B \, C` .

A =

$$\begin{bmatrix} \square & \square \end{bmatrix}$$

B =

$$\begin{bmatrix} \square & \square \end{bmatrix}$$

C =

$$\begin{bmatrix} \square & \square \end{bmatrix}$$

Question 25

0/1 pt 999 998

A batch of `134` computers has 3 types of products: `8` millions VND computers, `6` millions VND computers and `4` millions VND computers. If the value of the batch is `744` millions VND and the total value of the `8` millions VND computers and `6` millions VND computers is twice of the value of `4` millions VND computers, then how many of each type of computers are in the batch?

Answer:

The number of `8` millions VND computers is ____

The number of `6` millions VND computers is ____

The number of `4` millions VND computers is ____

Question 26 0/1 pt 999 998

Find `m` such that the following system has a unique solution `` `{(,,6y,+,z,=,100),(-2x,+,6y,+,2z,=,200),(7x,+,2y,+,mz,=,400):}` ``

Answer: m ? ______

Question 27 0/1 pt 999 998

Find all **values** of ` m\in RR` such that the system of vectors `[(-2),(10),(1)], [(7),(m),(1)],[(5),(7),(2)]` is linearly dependent.

Answer: m = ______ .

Question 28 0/1 pt 999 998

In `RR^3` , given` ` 3 bases` S_1,S_2,S_3` such that the matrix change of bases are : `P_{S_1 -gt S_2}=[(1,-3,0),(-2,1,2),(6,-11,-3)], P_{S_3 -gt S_2}=[(1,0,0),(0,1,-3),(6,-1,4)]` , knowing that

`[u]_{S_1}=[(-2),(4),(6)]` . Find ` [u]_{S_3}` .

`[u]_{S_3}` =

$$\begin{bmatrix} \square \\ \square \\ \square \end{bmatrix}$$

.

Question 29 0/1 pt 999 998

Given the system of vectors S: `[(2,1,3)],[(2,1,1)],[(x-1,2x,3x)] ` . Find `x \in RR` such that S is a spanning set of a two dimensional space.

`x` = ______ .s

Question 30 0/1 pt 999 998

Given the set of vectors : `S={ (-2,1,6),(-2,-10,-3) }` and let F be a subspae spanned by S, find all values `m \in RR` such that `M={(-8,-7,15), (3,5,m) } \in F` .

Answer:

`m` ? ______

Question 31 0/1 pt 999 998

Given the equation `AX+B^T=7 X+5 C` , where ` A=[(8,0,2),(4,8,5),(-4,-1,3)]` , ` B=[(-7,10,4),(6,-10,2),(9,-3,-4)]` ,`C=[(-8,9,2),(6,-9,7),(-6,4,10)]` .

1) Find X.

2) Compute E= `|2 A^2 C^{-1}|`

1) X=

$$\begin{bmatrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix}$$

2) E= ______ (Let the result in decimal number with 2 decimal digits rounded)