رياضيات 2
12:2
الثلاثاء 22/6/2021
أ.د. على صديق

Faculty of Computers & Information, Assiut University
1st Level
Final Exam
Duration: 2 hours

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* الإسم الرباعي (بالعربي فقط)

رانيا مصطفى عبد الجواد على

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* رقم الجلوس

162020220

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المستوي *

- الاول
- الثاني
- الثالث
- رابعة 2013
- رابعة 2014
- رابعة 2015
- رابعة 2016
- رابعة 2017

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البرنامج *

- عام
- بايو
- هندسة

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رقم المعمل *

- ج.
- د.

- اب
- اد
- اهـ
- أ٢
- ب٢
- ج٢
- د٢
- هـ٢
- أ٣
- ب٣
- ج٣
- د٣
- هـ٣
- أ٤
- ب٤

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* رقم الكمبيوتر

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* الكود (قد تمت مراجعة بيانات الطالب ورقم الجلوس)

frgN

8

(2 Points)

The element a_{ij} of any matrix A is present in

(a) i^{th} row and j^{th} column

(b) i^{th} column and j^{th} row

(c) $(i+j)^{th}$ row and column

(d) $(i-j)^{th}$ row and column

- a
- b
- c
- d

9

Question
(2 Points)

The reduced form of the Matrix in Gauss Elimination method is

a) Column Echelon Form

b) Row-Column Echelon Form

c) Column-Row Echelon Form

d) Row Echelon Form

a

b

c

d

10

Question
(2 Points)

- Is the function is $T\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} x^2 + y^2 \\ x\,y \end{bmatrix}$

(a) a linear transformation $T: R^2 \to R^2$

(b) not a linear transformation $T: R^2 \to R^2$

(c) not applicable.

a

b

c

11

Question
(2 Points)

Is the function is $\langle u, v \rangle = 5u_1v_1 + 4u_2$

(a) inner product on R^2

(b) not inner product on R^2

(c) not applicable .

- (●) a
- ( ) b
- ( ) c

12

Question
(2 Points)

With the inner product $\langle u, v \rangle = u_1v_1 + u_2v_2$, where $u = (u_1, u_2)$, $v =$

on $\mathbb{R}^2$, the set $\left\{\left(\frac{1}{\sqrt{5}}, -\frac{1}{\sqrt{5}}\right), \left(\frac{2}{\sqrt{30}}, \frac{3}{\sqrt{30}}\right)\right\}$ is orthonormal.

- ( ) True
- (●) False

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Question
(2 Points)

Which of the following equations is a variable separable l

A. $(x+x^2y)dy=(2x+xy^2)dx$

B. $(x+y)dx-2ydy=0$

C. $2ydx=(x^2+1)dy$

D. $y^2dx+(2x-3y)dy=0$

- a
- b
- c
- d

14

Question
(2 Points)

- A finite set $S=$:if V is called a basis for Vspace of elements of a linear

(a) S is linearly dependent and S spans V

(b) S is linearly independent and S spans V

(c) S is linearly independent and S not spans V

- a
- b
- c

15

(2 Points)

The set $V = \left\{ \begin{bmatrix} a & 1 \\ 1 & b \end{bmatrix} : a, b \in \mathbb{R} \right\}$ with summation and scalar multip

of matrices is not a linear space.

- True
- False

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Question
(2 Points)

Is the set a base for $S = \{1, x+1, x^2 - x\}$

(a) R^2

(b) P_2

(c) P_3

- a
- b
- c

17

Question
(2 Points)

- The correct form of the partial fraction decomposition for $\frac{x^2+1}{x^3+1}$ will be of the form

(a) $\frac{A}{x-1}-\frac{B}{x^2-x+1}$

(b) $\frac{A}{x+1}-\frac{B}{x^2-x+1}$

(c) $\frac{A}{x+1}-\frac{Bx+C}{x^2-x+1}$,

(d) none of these

- a
- b
- c
- d

18

Question
(2 Points)

- $\frac{x}{(x+2)(x-3)}=$

(a) $\frac{2}{5(x+2)}-\frac{3}{5(x-3)}$

(b) $\frac{2}{5(x+2)}+\frac{3}{5(x-3)}$

(c) $\frac{2}{5(x-2)}-\frac{3}{5(x+3)}$

(d) none of these

- a
- b
- c
- d

19

Question
(2 Points)

- The order of the differential equation $2x^2\frac{d^2y}{dx^2}-3\frac{dy}{dx}+y=0$ i

A. 2 B. 1 C. 0 D. not defi

- a
- b
- c
- d

20

Question
(2 Points)

If a system of equations has no solution, what does the graph look like?
A. intersecting lines B. parallel lines C. skew lines D. san

- a
- b
- c
- d

21

Question
(2 Points)

Let V be the set of all 2-vectors whose components as follows:

$V = \left\{ \begin{bmatrix} x \\ y \end{bmatrix} : x + y = 0 \right\}$, the set V is nonempty sinc

(a) $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$ is an element of V

(b) $\begin{bmatrix} 0 \\ 0 \end{bmatrix}$ is an element of V

(c) $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$ is an element of V

- a
- b
- c
- d

22

Question
(2 Points)

Solve this system of equations and comment on the nature of the solution u Elimination method.

$$x+y+z=0$$
$$-x-y+3z=3$$
$$-x-y-z=2$$

a) Unique Solution

b) No solution

c) Infinitely many Solutions

d) Finite solution

- a
- b
- c
- d

23

Question
(2 Points)

- Is the function is $T\left(\begin{bmatrix} a \\ b \\ c \end{bmatrix}\right) = \begin{bmatrix} 3a+c \\ b-2c \end{bmatrix}$

(a) a linear transformation $T: R^3 \to R^2$

(b) a linear transformation $T: R^2 \to R^3$

(c) not applicable.

a

b

c

24

Question
(2 Points)

· Find a matrix A such that

$$\left[2A^t + \begin{bmatrix} 1 & 0 \\ 1 & 2 \end{bmatrix}\right]^t = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$$

l give its first row.

A. $(2,-1)$

B. $(0,0)$

C. $(-1/2,1/2)$

D. $(0,1/2)$

a

b

c

d

25

Question
(2 Points)

Solve the given system of equation by Gauss Elimination method.

$$3x + 4y - z = -6$$
$$-2y + 10z = -8$$
$$4y - 2z = -2$$

(a) $(-2, -1, -1)$

(b) $(-1, -2, -1)$

(c) $(-1, -1, -2)$

(d) $(-1, -1, -1)$

a

b

c

d

26

Question
(2 Points)

The augmented matrix of the system of equations

$$\begin{aligned} 2x_1 + 4x_2 - 4x_3 &= 3 \\ x_1 + 8x_2 + 2x_3 &= 7 \\ 2x_1 + x_2 + x_3 &= 2 \end{aligned}$$

in the **row-echelon form** is

(a) $\left[\begin{array}{ccc|c} 1 & 5 & 2 & 7 \\ 0 & 1 & \frac{2}{3} & \frac{11}{12} \\ 0 & 0 & 1 & \frac{1}{4} \end{array}\right]$

(b) $\left[\begin{array}{ccc|c} 1 & 8 & 5 & 7 \\ 0 & 1 & \frac{2}{3} & \frac{11}{12} \\ 0 & 0 & 1 & \frac{1}{4} \end{array}\right]$

(c) $\left[\begin{array}{ccc|c} 1 & 8 & 2 & 5 \\ 0 & 1 & \frac{2}{3} & \frac{11}{12} \\ 0 & 0 & 1 & \frac{1}{4} \end{array}\right]$

(d) none of these.

- a
- b
- c
- d

27

Question
(2 Points)

The differential equation $2\frac{dy}{dx} + x^2 y = 2x + 3, y(0) = 5$

(a) linear

(b) nonlinear

(c) linear with fixed constants

(d) undeterminable to be linear or nonlinear

- a
- b
- c
- d

28

Question
(2 Points)

· In Gaussian elimination method, original equations are transformed by using

a) Column operations

b) Row Operations

c) Mathematical Operations

d) Subset Operation

- a
- b
- c
- d

29

Question
(2 Points)

- The form of the exact solution to $2\frac{dy}{dx}+3y=e^{-x}, y(0)=5$ is

(a) $Ae^{-1.5x}+Be^{-x}$

(b) $Ae^{-1.5x}+Bxe^{-x}$

(c) $Ae^{1.5x}+Be^{-x}$

(d) $Ae^{1.5x}+Bxe^{-x}$

- a
- b
- c
- d

30

Question
(2 Points)

· Singular matrix is?

A. non-invertible
B. invertible
C. Both non-invertible and invertible
D. None Of the above

- a
- b
- c
- d

31

Question
(2 Points)

- The aim of elimination steps in Gauss elimination method is to reduce the matrix to

a) diagonal

b) identity

c) lower triangular

d) upper triangular

- a
- b
- c

d

32

Question
(2 Points)

Is the function is $T\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} \cos x \\ \sin y \end{bmatrix}$

(a) a linear transformation $T: R^3 \to R^2$

(b) a linear transformation $T: R^2 \to R^2$

(c) a linear transformation $T: R^2 \to R^3$

(d) none of these.

a

b

c

d

33

Question
(2 Points)

- If $\frac{1}{(x^2-1)(x+1)} = \frac{A}{x-1} + \frac{B}{x+1} + \frac{C}{(x+1)^2}$, then $(A,B,C) =$

(a) $(-\frac{1}{4}, \frac{1}{4}, -\frac{1}{2})$

(b) $(\frac{1}{4}, -\frac{1}{2}, \frac{1}{2})$

(c) $(\frac{1}{2}, -\frac{1}{4}, \frac{1}{2})$.

(d) none of these.

- a
- b
- c
- d

34

Question
(2 Points)

With the inner product $\langle u, v \rangle = 3u_1v_1 + 2u_2v_2$, where $u = (u_1, u_2), v = (v_1, v_2$

on $\mathbb{R}^2$, the set $\left\{\left(\frac{1}{\sqrt{5}}, -\frac{1}{\sqrt{5}}\right), \left(\frac{2}{\sqrt{30}}, \frac{3}{\sqrt{30}}\right)\right\}$ is orthogonal.

- True
- False

35

Question
(2 Points)

· If determinant of a matrix is equal to zero, then it is said to b

(a) square matrix

(b) singular matrix

(c) non-singular matrix

(d) identical matrix

a

b

c

d

36

Question
(2 Points)

· If $\frac{3x^2-2x-5}{(x-2)(x+2)(x+3)}=\frac{A}{x-2}+\frac{B}{x+2}+\frac{C}{x+3}$, then $(A,B,C)=$

(a) $(\frac{3}{14},-\frac{11}{4},\frac{28}{5})$

(b) $(\frac{3}{20},-\frac{11}{4},\frac{28}{5})$

(c) $(\frac{3}{20},-\frac{11}{5},\frac{28}{5})$

(d) none of these.

a

b

c

d

37

Question
(2 Points)

- What is 'a', if $B = \begin{bmatrix} 1 & 4 \\ 2 & a \end{bmatrix}$ is a singular matrix ?

(a) 5

(b) 6

(c) 7

(d) 8.

a

b

c

d

38

Question
(2 Points)

- If A and B are matrices, then which from the following is

(a) $A + B \neq B + A$

(b) $(A^t)^t \neq A$

(c) $AB \neq BA$

(d) all are true

a

b

c

d

39

Question
(2 Points)

- Two matrices A and B are multiplied to get AB if

(a) both are rectangular

(b) both have same order

(c) no of columns of A is equal to no of rows of B

(d) no of rows of A is equal to no of columns of B

a

b

c

d

40

Question
(2 Points)

The solution of the initial value problem $xy' = y + x^2 \sin x, \quad y(\pi) = 0$

is given by

(a) cannot be determined from the given information

(b) $y = x \sin x$

(c) $y = -x\,(\cos x + 1)$

(d) $y = \pi + x \cos x$

- a
- b
- c
- d

41

(2 Points)

If the degree of numerator N(x) is equal or greater than the degree o
denominator D(x), then the fraction is:

A. proper
B. improper
C. both proper and improper

a

b

c

42

Question
(2 Points)

We can add two matrices having real numbers A and B if their

(a) order is same

(b) rows are same

(c) columns are same

(d) elements are same

a

b

c

d

43

Question
(2 Points)

- The order of the differential equation $2x^2\frac{d^2y}{dx^2}-3\frac{dy}{dx}+y=0$ i

A. 2 B. 1 C. 0 D. not defi

a

b

c

d

44

(2 Points)

If the order of matrix A is $m \times p$ and the order of B is $p \times n$. Then the order o

is

(a) $m \times n$

(b) $n \times m$

(c) $n \times p$

(d) $m \times p$

a

b

c

d

45

Question
(2 Points)

In matrices $(A + B)^t$ equals to

(a) A^t

(b) B^t

(c) $A^t + B^t$

(d) $A^t B^t$

- a
- b
- c
- d

46

(2 Points)

- With $B=\begin{bmatrix}-1 & 2\\ 2 & 1\\ -1 & 2\end{bmatrix}$, $C=\begin{bmatrix}0 & -2\\ 3 & 1\\ 2 & -3\end{bmatrix}$, $D=\begin{bmatrix}-1 & 4 & 2\\ 2 & 0 & 1\end{bmatrix}$, $E=\begin{bmatrix}2 & 3 & 1\\ 2 & 0 & 0\end{bmatrix}$

We have $(2B-C)(3D-E))=$

(a) $\begin{bmatrix}34 & -8 & 8\\ -1 & 9 & 8\\ 48 & -36 & 1\end{bmatrix}$

(b) $\begin{bmatrix}34 & -18 & 8\\ -1 & 9 & 8\\ 48 & -36 & 1\end{bmatrix}$

(c) $\begin{bmatrix}34 & -18 & 8\\ -1 & 9 & 8\\ 48 & -6 & 1\end{bmatrix}$

(d) none of these.

- a
- b
- c
- d

47

Question
(2 Points)

Let x, y be orthogonal vectors in an inner product space (V; (.; .)). Then the vectors u = x + y and v = x - y,

A. must be orthogonal.

B. are orthogonal if and only if $\|x\| = \|y\| = 1$

C. are orthogonal if and only if $\|x\| = \|y\|$

a

b

c

48

Question
(2 Points)

Is the set $U = \left\{ \begin{bmatrix} x \\ y \end{bmatrix} : 2x + 3y = 0 \right\}$

(a) a subspace of R^2

(b) not a subspace of R^2

(c) not applicable.

a

b

c

49

Question
(2 Points)

Consider the system of linear equations given by

$$x_1 + x_2 + x_3 + x_4 + x_5 = 1$$
$$x_3 + x_4 + x_5 = 2$$
$$x_5 = 3$$

Determine how many parameters the solution set depend

A. 1 parameters.

B. 2 parameters.

C. 5 parameters.

D. 0 parameters.

- a
- b
- c
- d

50

Question
(2 Points)

If $\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \\ a_{31} & a_{32} \end{bmatrix} A = \begin{bmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{bmatrix}$, then order of matrix A =

(a) 2 x 2

(b) 2 x 3

(c) 3 x 2

(d) 3 x 3.

- a
- b
- c
- d

51

(2 Points)

Let

$$A=\begin{bmatrix}1 & 2 & 1\\ 2 & t & 0\\ 1 & 0 & -1\end{bmatrix}$$

Find the set of values of t for which the homogeneous system of linear equation a non-trivial solution.

A. $t=-3$

B. $t=2$

C. $t\neq -3$

a

b

c

52

Question
(2 Points)

Solve the equations using Gauss Jordan method.

$$2x-3y+z=-1$$
$$x+4y+5z=25$$
$$3x-4y+z=2$$

(a) $x=1, y=3, z=4$

(b) $x=1, y=3, z=5$

(c) $x=1, y=3, z=7$

(d) $x=1, y=3, z=2$

- a
- b
- c
- d

53

Question
(2 Points)

Let A; B; C be square invertible matrices satisfying $AB=B^2C$. A
det $B=3$ and det $C=2$. Find a formula for A and calculate the determ

A. $A=BC$, $\det A=6$.

B. $A=B^3C$, $\det A=11$.

C. $A=B^2CB^{-1}$, $\det A=6$.

D. $A=B^2CB^{-1}$, $\det A=5$.

- a
- b
- c

d

54

Question
(2 Points)

Given $A=\begin{bmatrix}2 & -0.1\\ 0 & 3\end{bmatrix}$, $A^{-1}=\begin{bmatrix}0.5 & a\\ 0 & b\end{bmatrix}$. Fined $a+b$

A. $\frac{6}{20}$ B. $\frac{7}{20}$ C. $\frac{8}{20}$ D.

a

b

c

d

55

Question
(2 Points)

)- The base for the subspace $U=\left\{\begin{bmatrix} a \\ b \\ c \end{bmatrix} : a+b+c=0 \right\}$ of R^3 is:

(a) $\begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ -1 \\ 1 \end{bmatrix}$

(b) $\begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ -1 \end{bmatrix}$

(c) $\begin{bmatrix} -1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix}$

(d) all of these

- a
- b
- c
- d

56

Question
(2 Points)

State the type of partial fraction $\frac{125+4x-9x^2}{(x-1)(x+3)(x+4)}$

A. linear factor.
B. repeated factor.
C. quadratic factor.
D. improper fraction

- a
- b
- c
- d

57

Question
(2 Points)

The solution of the differential equation $\frac{dy}{dx}+y\tan x=\sec x$ is

(a) $y=\sin x-\cos x$

(b) $y=\sin x+c\cos x$

(c) $(y-\sin x)\sin x=c$,

(d) none of these.

- a
- b
- c
- d