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**State** Finished
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**Time taken** 1 hour 15 mins
**Grade** **23.00** out of 32.00 (**72**%)

Question **1**

Correct

Mark 1.00 out of 1.00

Let $V$ be a vector space, $\{v_1, v_2, \dots v_n\}$ a spanning set for $V$, and $v \in V$, then the vectors $\{v_1, v_2, \dots v_n, v\}$ form a spanning set for $V$.

Select one:

- a. False
- b. True ✔

The correct answer is: True

Question **2**

Correct

Mark 1.00 out of 1.00

If $\{v_1, v_2, v_3, v_4\}$ forms a spanning set for a vector space $V$, $\dim(V) = 3$, $v_4$ can be written as a linear combination of $v_1, v_2, v_3$, then

Select one:

- a. $\{v_1, v_2, v_3\}$ do not form a spanning set for $V$
- b. $\{v_1, v_2, v_3\}$ is a basis for $V$ ✔
- c. $\{v_1, v_2, v_3\}$ are linearly dependent
- d. $v_1$ can be written as a linear combination of $v_2, v_3, v_4$

The correct answer is: $\{v_1, v_2, v_3\}$ is a basis for $V$

Question **3**

Correct

Mark 1.00 out of 1.00

The nullity of $A = \begin{pmatrix} 1 & 1 & 0 & 2 & 0 \\ 1 & 2 & -1 & 0 & 1 \\ 2 & 3 & -1 & 2 & 1 \end{pmatrix}$ is

Select one:

- a. $4$
- b. $3$ ✔
- c. $2$
- d. $1$

The correct answer is: $3$

Question **4**

Correct

Mark 1.00 out of 1.00

Let $E = [2 + x, 1 - x, x^2 + 1]$ be an ordered basis for $P_3$. If $[p(x)]_E = \begin{pmatrix} 1 \\ -1 \\ 3 \end{pmatrix}$, then

Select one:

- a. $p(x) = 3x^2 + 2x + 4$ ✔
- b. $p(x) = 3x^2 + 2x + 5$
- c. $p(x) = 3x^2 + x - 3$
- d. $p(x) = x^2 - x + 3$

The correct answer is: $p(x) = 3x^2 + 2x + 4$

Question **5**

Incorrect

Mark 0.00 out of 1.00

Let $S = \{f \in C[-1, 1] : f(-1) = f(1)\}$, then $S$ is a subspace of $C[-1, 1]$.

Select one:

- a. True
- b. False ✖

The correct answer is: True

Question **6**

Incorrect

Mark 0.00 out of 1.00

If $\{v_1, \cdots, v_n\}$ are linearly independent and $v$ is not in Span$\{v_1, \cdots, v_n\}$, then $\{v_1, \cdots, v_n, v\}$ are linearly independent.

Select one:

- a. True
- b. False ✖

The correct answer is: True

Question **7**

Correct

Mark 1.00 out of 1.00

If $A$ is a nonzero $3 \times 2$ matrix such that $Ax = 0$ has infinite number of solutions, then rank$(A) = 1$.

Select one:

- a. True ✔
- b. False

The correct answer is: True

Question **8**

Correct

Mark 1.00 out of 1.00

Let $S = \{ \begin{pmatrix} a+b+2c \\ a+2c \\ a+b+2c \end{pmatrix} : a, b \in \mathbb{R} \}$. Then dimension of $S$ equals

Select one:

- a. 2 ✔
- b. 0
- c. 3
- d. 1

The correct answer is: $2$

Question **9**

Correct

Mark 1.00 out of 1.00

$\dim\big(\text{span}(x^2, 3+x^2, x^2+1)\big)$ is

Select one:

- a. 0
- b. 1
- c. 2 ✔
- d. 3

The correct answer is: $2$

Question **10**

Correct

Mark 1.00 out of 1.00

dimension of the subspace $S = \text{Span}\left\{ A_1 = \begin{pmatrix} 2 & 1 \\ 0 & 1 \end{pmatrix}, A_2 \begin{pmatrix} -1 & 0 \\ 3 & 1 \end{pmatrix}, A_3 = \begin{pmatrix} -8 & -3 \\ 6 & -1 \end{pmatrix} \right\}$ is

Select one:

- a. 0
- b. 1
- c. 2 ✔
- d. 3

The correct answer is: $2$

Question **11**

Correct

Mark 1.00 out of 1.00

Which of the following **is not a basis** for the corresponding space

Select one:

- a. $\{(1,1)^T, (2,-3)^T\}; \mathbb{R}^2$
- b. $\{(-2,-1,-1)^T, (-3,-3,0)^T, (2,0,2)^T\}; \mathbb{R}^3$ ✔
- c. $\{5-x, x-1\}; P_2$
- d. $\{x+4, 1-x^2, x^2+x+3\}; P_3$

The correct answer is: $\{(-2,-1,-1)^T, (-3,-3,0)^T, (2,0,2)^T\}; \mathbb{R}^3$

Question **12**

Correct

Mark 1.00 out of 1.00

The transition matrix from the standard basis $S = \left[e_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}, e_2 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}\right]$ to the ordered basis $U = \left[u_1 = \begin{pmatrix} 1 \\ 2 \end{pmatrix}, u_2 = \begin{pmatrix} 2 \\ 5 \end{pmatrix}\right]$ is

Select one:

- a. $T = \begin{pmatrix} -1 & 2 \\ 2 & -5 \end{pmatrix}$
- b. $T = \begin{pmatrix} 5 & -2 \\ -2 & 1 \end{pmatrix}$ ✔
- c. $T = \begin{pmatrix} 1 & 2 \\ 2 & 5 \end{pmatrix}$
- d. $T = \begin{pmatrix} 1 & -2 \\ -2 & 5 \end{pmatrix}$

The correct answer is: $T = \begin{pmatrix} 5 & -2 \\ -2 & 1 \end{pmatrix}$

Question **13**

Correct

Mark 1.00 out of 1.00

If $A$ is a $5 \times 4$-matrix, and $Ax = 0$ has only the zero solution, then $\text{rank}(A) = 4$.

Select one:

- a. True ✔
- b. False

The correct answer is: True

Question **14**

Correct

Mark 1.00 out of 1.00

If the columns of $A_{n \times n}$ are linearly independent and $b \in \mathbb{R}^n$, then the system $Ax = b$ has

Select one:

- a. exactly 2 solutions
- b. exactly one solution ✔
- c. no solution
- d. infinitely many solutions

The correct answer is: exactly one solution

Question **15**

Incorrect

Mark 0.00 out of 1.00

If $A$ is a $3 \times 5$-matrix, rows of $A$ are linearly independent, then

Select one:

- a. $\text{rank}(A) = \text{nullity}(A) + 3$
- b. $\text{rank}(A) = \text{nullity}(A) + 2$ ✖
- c. $\text{rank}(A) = \text{nullity}(A) + 1$
- d. $\text{rank}(A) = \text{nullity}(A)$

The correct answer is: $\text{rank}(A) = \text{nullity}(A) + 1$

Question **16**

Correct

Mark 1.00 out of 1.00

Let $E = [3 - x, 2 + x], F = [1, x]$ be ordered bases for $P_2$. The transition matrix from $E$ to $F$ is

Select one:

- a. $\begin{pmatrix} -1 & 1 \\ 2 & 3 \end{pmatrix}$
- b. $\begin{pmatrix} 1 & 2 \\ -1 & 3 \end{pmatrix}$
- c. $\begin{pmatrix} 3 & 2 \\ -1 & 1 \end{pmatrix}$ ✔
- d. $\begin{pmatrix} -1 & 1 \\ 3 & 2 \end{pmatrix}$

The correct answer is: $\begin{pmatrix} 3 & 2 \\ -1 & 1 \end{pmatrix}$

Question **17**

Correct

Mark 1.00 out of 1.00

If $\{v_1, v_2, v_3, v_4\}$ is a basis for a vector space $V$, then the set $\{v_1, v_2, v_3\}$ is

Select one:

- a. linearly independent and not a spanning set for $V$. ✔
- b. linearly independent and a spanning set for $V$.
- c. linearly dependent and a spanning set
- d. linearly dependent and not a spanning set for $V$.

The correct answer is: linearly independent and not a spanning set for $V$.

Question **18**

Correct

Mark 1.00 out of 1.00

If A is a $3 \times 2$ matrix, then

Select one:

- a. The rows of $A$ are linearly dependent ✔
- b. The columns of $A$ are linearly dependent
- c. The columns of $A$ are linearly independent
- d. Rank$(A) = 3$

The correct answer is: The rows of $A$ are linearly dependent

Question **19**

Incorrect

Mark 0.00 out of 1.00

Let $A$ be an $m \times n$ matrix. If the rows of $A$ are linearly dependent, then $n \leq m$

Select one:

- a. True
- b. False ✖

The correct answer is: True

Question **20**

Correct

Mark 1.00 out of 1.00

The vectors $\{x+1, x^2+2x+1, x^2+x+1\}$ form a basis for $P_3$.

Select one:

- a. True ✔
- b. False

The correct answer is: True

Question **21**

Correct

Mark 1.00 out of 1.00

If $A$ is a $3 \times 5$ matrix, then

Select one:

- a. nullity$(A) \geq 2$ ✔
- b. The rows of $A$ are linearly dependent
- c. $Rank(A) = 2$
- d. The columns of $A$ are linearly independent

The correct answer is: nullity$(A) \geq 2$

Question **22**

Correct

Mark 1.00 out of 1.00

let $A$ be a $4 \times 7$-matrix, if the row echelon form of $A$ has 2 nonzero rows, then dim(column space of $A$) is

Select one:

- a. 2 ✔
- b. 3
- c. 5
- d. 7

The correct answer is: 2

Question **23**

Correct

Mark 1.00 out of 1.00

if $\{v_1, v_2, \cdots, v_k\}$ is a spanning set for $\mathbb{R}^{3\times 2}$, then

Select one:

- a. $k \leq 6$
- b. $k > 6$
- c. $k = 6$
- d. $k \geq 6$ ✔

The correct answer is: $k \geq 6$

Question **24**

Incorrect

Mark 0.00 out of 1.00

The coordinate vector of $6+8x$ with respect to the basis $[2x, 2]$ is $(4,3)^T$

Select one:

- a. False ✖
- b. True

The correct answer is: True

Question **25**

Correct

Mark 1.00 out of 1.00

Let $E = [2 + x, 1 - x, x^2 + 1]$ be an ordered basis for $P_3$. If $p(x) = 2x^2 - 2x + 1$, then the coordinate vector of $p(x)$ with respect to $E$ is

Select one:

a. $\begin{pmatrix} -2 \\ -3 \\ 2 \end{pmatrix}$

b. $\begin{pmatrix} -1 \\ 1 \\ 2 \end{pmatrix}$ ✔

c. $\begin{pmatrix} 2 \\ -3 \\ 1 \end{pmatrix}$

d. $\begin{pmatrix} 3 \\ 2 \\ -3 \end{pmatrix}$

The correct answer is: $\begin{pmatrix} -1 \\ 1 \\ 2 \end{pmatrix}$

Question **26**

Incorrect

Mark 0.00 out of 1.00

If $A$ is an $m \times n$-matrix, and columns of $A$ are linearly independent, then

Select one:

a. $n \leq m$

b. $m \leq n$ ✖

c. $m = n + 1$

d. $m = n$

The correct answer is: $n \leq m$

Question **27**

Correct

Mark 1.00 out of 1.00

Let $S = \{\begin{pmatrix} x \\ y \end{pmatrix} \in \mathbb{R}^2 : x = y + 1\}$, then $S$ is a subspace of $\mathbb{R}^2$.

Select one:

a. False ✔

b. True

The correct answer is: False

Question **28**

Incorrect

Mark 0.00 out of 1.00

If $A = \begin{pmatrix} -1 & -2 & -1 & 0 \\ 1 & 2 & 2 & 0 \\ -2 & -4 & 0 & 0 \end{pmatrix}$, then $\text{rank}(A) = 3$.

Select one:

a. False

b. True ✖

The correct answer is: False

Question **29**

Incorrect

Mark 0.00 out of 1.00

If the rows of an $n \times n$-matrix $A$ form a basis for $\mathbb{R}^{1\times n}$, then the columns of $A$ also form a basis for $\mathbb{R}^n$.

Select one:

- a. False ✖
- b. True

The correct answer is: True

Question **30**

Correct

Mark 1.00 out of 1.00

If A is a $4 \times 6$ matrix, then nullity of $A \geq 2$.

Select one:

- a. False
- b. True ✔

The correct answer is: True

Question **31**

Incorrect

Mark 0.00 out of 1.00

The vectors $\{(1,-1,1)^T, (1,-1,2)^T, (1,-2,1)^T\}$ form a basis for $\mathbb{R}^3$.

Select one:

- a. True
- b. False ✖

The correct answer is: True

Question **32**

Correct

Mark 1.00 out of 1.00

If $A$ is an $n \times n$ singular matrix, then

Select one:

- a. The columns of $A$ are linearly dependent ✔
- b. $N(A) = \{0\}$
- c. The rows of $A$ are linearly independent
- d. rank$(A) = n$

The correct answer is: The columns of $A$ are linearly dependent

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