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Grade	**30.00** out of 32.00 (**94**%)

Question **1**
Correct
Mark 1.00 out of 1.00

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

Select one:
- a. False
- b. True ✔

The correct answer is: True

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

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

Question **3**
Correct
Mark 1.00 out of 1.00

If A is a nonzero 4×2-matrix and $Ax=0$ has infinitely many solutions, then rank$(A)=$

Select one:
- a. 4
- b. 3
- c. 1 ✔
- d. 2

The correct answer is: 1

Question **4**
Correct
Mark 1.00 out of 1.00

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

Select one:
- a. True ✔
- b. False

The correct answer is: True

Question **5**
Correct
Mark 1.00 out of 1.00

Every spanning set for $\mathbb{R}^3$ contains at least 3 vectors.

Select one:
- a. False
- b. True ✔

The correct answer is: True

Question **6**
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 $U = \left[u_1 = \begin{pmatrix} 1 \\ 3 \end{pmatrix}, u_2 = \begin{pmatrix} 2 \\ 7 \end{pmatrix} \right]$ is

Select one:
- a. $T = \begin{pmatrix} 1 & 2 \\ 3 & 7 \end{pmatrix}$
- b. $T = \begin{pmatrix} 1 & -2 \\ -3 & 7 \end{pmatrix}$
- c. $T = \begin{pmatrix} -7 & 2 \\ 3 & -1 \end{pmatrix}$
- d. $T = \begin{pmatrix} 7 & -2 \\ -3 & 1 \end{pmatrix}$ ✔

The correct answer is: $T = \begin{pmatrix} 7 & -2 \\ -3 & 1 \end{pmatrix}$

Question **7**
Correct
Mark 1.00 out of 1.00

If A is a 3×4-matrix, rows of A are linearly independent, then

Select one:
- a. $\text{rank}(A) = 3 - \text{nullity}(A)$
- b. $\text{nullity}(A) = 1$ ✔
- c. $\text{nullity}(A) = 3$
- d. $\text{rank}(A) = \text{nullity}(A)$

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

Question **8**
Correct
Mark 1.00 out of 1.00

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

Select one:
- a. False
- b. True ✔

The correct answer is: True

Question **9**
Correct
Mark 1.00 out of 1.00

The rank of $A = \begin{pmatrix} 1 & 4 & 1 & 2 & 0 \\ 2 & 6 & -1 & 2 & -1 \\ 3 & 10 & 0 & 4 & 0 \end{pmatrix}$ is

Select one:
- a. 4
- b. 1
- c. 2
- d. 3 ✔

The correct answer is: 3

Question **10**
Correct
Mark 1.00 out of 1.00

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

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

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

Question **11**
Correct
Mark 1.00 out of 1.00

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

Select one:
- a. $m = n$
- b. $n \leq m$ ✔
- c. $m \leq n$
- d. $m = n + 1$

The correct answer is: $n \leq m$

Question **12**
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. $\begin{pmatrix} 1 & 2 \\ -1 & 3 \end{pmatrix}$
- b. $\begin{pmatrix} 3 & 2 \\ -1 & 1 \end{pmatrix}$ ✔
- c. $\begin{pmatrix} -1 & 1 \\ 2 & 3 \end{pmatrix}$
- d. $\begin{pmatrix} -1 & 1 \\ 3 & 2 \end{pmatrix}$

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

Question **13**
Correct
Mark 1.00 out of 1.00

Let $S = \{f \in C[-1,1] : f \text{ is an odd function }\}$, then S is a subspace of $C[-1,1]$.

Select one:

- a. True ✔
- b. False

The correct answer is: True

Question **14**
Correct
Mark 1.00 out of 1.00

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

Select one:

- a. True
- b. False ✔

The correct answer is: False

Question **15**
Correct
Mark 1.00 out of 1.00

If A is a 3×3-matrix, and $Ax = 0$ has only the zero solution, then rank$(A) =$

Select one:

- a. 0
- b. 3 ✔
- c. 2
- d. 1

The correct answer is: 3

Question **16**

Correct

Mark 1.00 out of 1.00

The coordinate vector of $\begin{pmatrix} -3 \\ -2 \\ -5 \end{pmatrix}$ with respect to the ordered basis $\left[\begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ 2 \\ 2 \end{pmatrix}, \begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix}\right]$ is

Select one:

- a. $\begin{pmatrix} 1 \\ -4 \\ 3 \end{pmatrix}$
- b. $\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$
- c. $\begin{pmatrix} 3 \\ 2 \\ 5 \end{pmatrix}$
- d. $\begin{pmatrix} -1 \\ 4 \\ -3 \end{pmatrix}$ ✔

The correct answer is: $\begin{pmatrix} -1 \\ 4 \\ -3 \end{pmatrix}$

Question **17**

Correct

Mark 1.00 out of 1.00

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

Select one:

- a. 2 ✔
- b. 3
- c. 0
- d. 1

The correct answer is: 2

Question **18**

Incorrect

Mark 0.00 out of 1.00

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

Select one:

- a. 2
- b. 0
- c. 3 ✖
- d. 1

The correct answer is: 2

Question 19
Correct
Mark 1.00 out of 1.00

If A is an $m \times n$-matrix, and columns of A form a spanning set for $\mathbb{R}^m$, then

Select one:

- a. $m \leq n$ ✔
- b. $n \leq m$
- c. $m = n$
- d. $m = n + 1$

The correct answer is: $m \leq n$

Question 20
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. $p(x) = x^2 - x + 3$
- c. $p(x) = 3x^2 + 2x + 5$
- d. $p(x) = 3x^2 + x - 3$

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

Question 21
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 dependent and a spanning set
- b. linearly independent and a spanning set for V.
- c. linearly dependent and not a spanning set for V.
- d. linearly independent and not a spanning set for V. ✔

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

Question 22
Incorrect
Mark 0.00 out of 1.00

If A is 5×3-matrix, rank$(A) = 3$, then the system $Ax = b$ has infinitely many solutions for every $b \in \mathbb{R}^3$.

Select one:

- a. True ✖
- b. False

The correct answer is: False

Question **23**
Correct
Mark 1.00 out of 1.00

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

Select one:

- a. False
- b. True ✔

The correct answer is: True

Question **24**
Correct
Mark 1.00 out of 1.00

Every linearly independent set of vectors in $\mathbb{R}^4$ has exactly 4 vectors.

Select one:

- a. False ✔
- b. True

The correct answer is: False

Question **25**
Correct
Mark 1.00 out of 1.00

If A is an $n \times n$-matrix and for each $b \in \mathbb{R}^n$ the system $Ax = b$ has a unique solution, then

Select one:

- a. rank$(A) = n - 1$
- b. A is nonsingular ✔
- c. nullity$(A) = 1$
- d. A is singular

The correct answer is: A is nonsingular

Question **26**
Correct
Mark 1.00 out of 1.00

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

Select one:

- a. True
- b. False ✔

The correct answer is: False

Question **27**
Correct
Mark 1.00 out of 1.00

If A is a 4×3 matrix such that $N(A) = \{0\}$, and b can be written as a linear combination of the columns of A, then

Select one:

- a. The system $Ax = b$ has exactly two solutions
- b. The system $Ax = b$ has exactly one solution ✔
- c. The system $Ax = b$ has infinitely many solutions
- d. The system $Ax = b$ is inconsistent

The correct answer is: The system $Ax = b$ has exactly one solution

Question **28**
Correct
Mark 1.00 out of 1.00

Let A be a 4×3-matrix with nullity$(A) = 0$. Then rank$(A) = 1$

Select one:
- a. True
- b. False ✔

The correct answer is: False

Question **29**
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 $Ax = b$ is inconsistent.

Select one:
- a. False ✔
- b. True

The correct answer is: False

Question **30**
Correct
Mark 1.00 out of 1.00

Let V be a vector space of dimension 4 and $W = \{v_1, v_2, v_3, v_4, v_5\}$ a set of nonzero vectors of V, then

Select one:
- a. W is a basis
- b. W is linearly independent
- c. W is a spanning set
- d. W is linearly dependent ✔

The correct answer is: W is linearly dependent

Question **31**
Correct
Mark 1.00 out of 1.00

If A is a 3×5-matrix, rows of A are linearly independent, then

Select one:
- a. rank$(A) =$ nullity$(A) + 1$ ✔
- b. rank$(A) =$ nullity$(A) + 3$
- c. rank$(A) =$ nullity(A)
- d. rank$(A) =$ nullity$(A) + 2$

The correct answer is: rank$(A) =$ nullity$(A) + 1$

Question **32**
Correct
Mark 1.00 out of 1.00

If $v_1, v_2, \cdots, v_n \in V$, dim$(V) = n$ and $v_1, v_2, \cdots, v_n$ are linearly independent, then Span $(v_1, v_2, \cdots, v_n) = V$, .

Select one:
- a. True ✔
- b. False

The correct answer is: True

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