Assignment WW-M2- vectors

1. (1 point) Let $x = (-6,-3,7)$ and $y = (-6,7,0)$ be in $\mathbb{R}^3$. Compute the following:

$x+y$ = (___, ___, ___)

$-6x$ = (___, ___, ___)

$x-y$ = (___, ___, ___)

-6 $x+2y$= (___, ___, ___)

Correct Answers:

- -12
- 4
- 7
- 36
- 18
- -42
- 0
- -10
- 7
- 24
- 32
- -42

2. (1 point) Let $x = (-8,2,-4)$ be in $\mathbb{R}^3$ and a be in $\mathbb{R}$. Then ax = (___, 12 , ___).

Correct Answers:

- -48
- -24

3. (1 point) Use the Gauss-Jordan reduction to solve the following linear system:

$$\begin{cases} x_1 - x_2 + 5x_3 = 3 \\ 6x_1 - 5x_2 + 5x_3 = 8 \\ -3x_1 + 60x_3 = 21 \end{cases}$$

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \end{bmatrix} + s \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}$$

Solution:

SOLUTION: By using the Gauss-Jordan reduction, we can find the reduced row echelon form of the augmented matrix of our system which turns out to be:

$$\left[\begin{array}{ccc|c} 1 & 0 & -20 & -7 \\ 0 & 1 & -25 & -10 \\ 0 & 0 & 0 & 0 \end{array}\right]$$

Hence, x_1, x_2 are lead variables and x_3 is the only free variable. By writing down the system corresponding to the RRE form, we get that

$$x_1 = -7+20x_3 \qquad \text{and} \qquad x_2 = -10+25x_3,$$

where x_3 is free (can take any value). Therefore every vector of the form

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} -7 \\ -10 \\ 0 \end{bmatrix} + \begin{bmatrix} 20 \\ 25 \\ 1 \end{bmatrix} s$$

is a solution, and every solution has that form for some value of s.

Correct Answers:

- $\begin{bmatrix} -7 \\ -10 \\ 0 \end{bmatrix}$
- $\begin{bmatrix} 20 \\ 25 \\ 1 \end{bmatrix}$

4. (1 point) Express the vector $\vec{v} = \begin{bmatrix} 31 \\ -10 \end{bmatrix}$ as a linear combination of $\vec{x} = \begin{bmatrix} -2 \\ 5 \end{bmatrix}$ and $\vec{y} = \begin{bmatrix} -5 \\ -1 \end{bmatrix}$.

$\vec{v}$ = ___ $\vec{x}$+ ___ $\vec{y}$.

Correct Answers:

- -3
- -5

5. (1 point) Let

$$\vec{v}_1 = \begin{bmatrix} -2 \\ 4 \\ -1 \end{bmatrix}, \quad \vec{v}_2 = \begin{bmatrix} -4 \\ 6 \\ -1 \end{bmatrix}, \quad \vec{y} = \begin{bmatrix} 10 \\ -12 \\ h \end{bmatrix}.$$

For what value of h is $\vec{y}$ in the plane spanned by $\vec{v}_1$ and $\vec{v}_2$?

h = _____

Correct Answers:

- 1

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