Homework Sec 2.1

Find the sum of the vectors and illustrate the sum geometrically

1.
$$\vec{u} = (1, 3), \vec{v} = (2, -2)$$

2.
$$\vec{u} = (2, -3), \vec{v} = (-3, -1)$$

Find the vector \vec{v} and verify the specified vector operations geometrically, when

$$\vec{u} = (-2, 3), \quad \vec{w} = (-3, -2)$$

Given
$$\vec{u} = (1, 2, 3)$$
, $\vec{v} = (2, 2, -1)$, $\vec{w} = (4, 0, -4)$. Find

6.
$$\vec{u} - \vec{v}$$
 | **7.** $\vec{v} - \vec{u}$ | **8.** $2\vec{u} + 4\vec{v} - \vec{w}$ | **9.** Find \vec{z} : $3\vec{u} - 4\vec{z} = \vec{w}$

Given
$$\vec{u} = (4, 0, -3, 5), \vec{v} = (0, 2, 5, 4)$$
. Find

10.
$$\vec{u} - \vec{v}$$
 11. $2(\vec{u} + 3\vec{v})$ **12.** $2\vec{v} - \vec{u}$

Given
$$\vec{u} = (1, 2, -3, 1), \vec{v} = (0, 2, -1, -2)$$
. Find

13.
$$\vec{u} + 2\vec{v}$$
 14. $\vec{w} - 3\vec{u}$ **15.** $4\vec{v} + \frac{1}{2}\vec{u} - \vec{w}$

16. Write
$$\vec{v} = (2, 1)$$
 as a linear combination of $\vec{u} = (1, 2)$ and $\vec{w} = (1, -1)$

17. Write
$$\vec{v} = (10, 1, 4)$$
 as a linear combination of $\vec{u}_1 = (2, 3, 5)$, $\vec{u}_2 = (1, 2, 4)$, $\vec{u}_3 = (-2, 2, 3)$

18. Write the third column of the matrix as a linear combination of the first two columns, if possible.

$$\begin{pmatrix}
1 & 2 & 3 \\
7 & 8 & 9 \\
4 & 5 & 6
\end{pmatrix}$$

19. Describe the zero vector of
$$\mathbb{R}^4$$

20. Describe the zero vector of
$$M_{43}$$

21. Describe the zero vector of
$$P_3$$

22. Determine whether the set of all third-degree polynomials is a vector space.

23. Determine whether the set
$$\{(x, y): x \ge 0, y \in \mathbb{R}\}$$
 is a *vector space*.

- **24.** Determine whether the set of all 2×2 matrices of the form $\begin{bmatrix} a & b \\ c & 0 \end{bmatrix}$ is a *vector space*.
- **25.** Determine whether the set $\{(x, 2x): x \in \mathbb{R}\}$ is a *vector space*.