Homework ***Sec*** **2.1**

Find the sum of the vectors and illustrate the sum geometrically

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

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

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

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

3. $\vec{v} = \frac{3}{2}\vec{u}$	**4.** $\vec{v} = \vec{u} + 2\vec{w}$	**5.** $\vec{v} = \frac{1}{2}(3\vec{u} + \vec{w})$

Given $\vec{u} = (1,\ 2,\ 3),\quad \vec{v} = (2,\ 2,\ -1),\quad \vec{w} = (4,\ 0,\ -4)$. 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 $\vec{u} = (4,\ 0,\ -3,\ 5),\quad \vec{v} = (0,\ 2,\ 5,\ 4)$. Find

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

Given $\vec{u} = (1,\ 2,\ -3,\ 1),\quad \vec{v} = (0,\ 2,\ -1,\ -2)$. 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 $\vec{u}_1 = (2,\ 3,\ 5),\quad \vec{u}_2 = (1,\ 2,\ 4),\quad \vec{u}_3 = (-2,\ 2,\ 3)$

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 $M_{4,3}$

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***.