$$\frac{(10,-8,3)+(20,12,-8)+(-8,-6,-2)+(-9,8,6)}{10}$$

1.3

29.

| Point | Mass |
|---|---|
| $\vec{v}_1=(5,-4,3)$ | 2g |
| $\vec{v}_2=(4,3,-2)$ | 5g |
| $\vec{v}_3=(-4,-3,-1)$ | 2g |
| $\vec{v}_4=(-9,8,6)$ | 1g |

In order to compute the center of gravity of the system consisting of the point masses to the left, we must first find the total mass of the system of point masses with the equation:

$$m = 2+5+2+1 = 10$$

Then we can find the center of gravity of the system with the equation $\bar{v} = \frac{1}{m}[m_1\vec{v}_1 + m_2\vec{v}_2 + m_3\vec{v}_3 + m_4\vec{v}_4]$. So,

$$\begin{aligned}\bar{v} &= \tfrac{1}{10}[2(5,-4,3)+5(4,3,-2)+2(-4,-3,-1)+(-9,8,6)] \\ &= \tfrac{1}{10}[(10,-8,6)+(20,15,-10)+(-8,-6,-2)+(-9,8,6)] \\ &= \tfrac{1}{10}[(13,9,0)] \\ &= (1.3,.9,0)\end{aligned}$$

From this equation, we can find that the center of gravity is at the point $\boxed{(1.3,.9,0).}$

30. If we were to let m be the total mass of the system of points then, by definition

$$\bar{v} = \frac{1}{m}[m_1\vec{v}_1 + \dots m_k\vec{v}_k] \text{ or } \bar{v} = \frac{m_1}{m}v_1 + \dots \frac{m_k}{m}\vec{v}_k$$

The second equation shows that $\bar{v}$ is a linear combination of $\vec{v}_1 \dots \vec{v}_k$ and therefore $\boxed{\bar{v} \text{ is in Span}\{\vec{v}_1, \dots, \vec{v}_k\}.}$