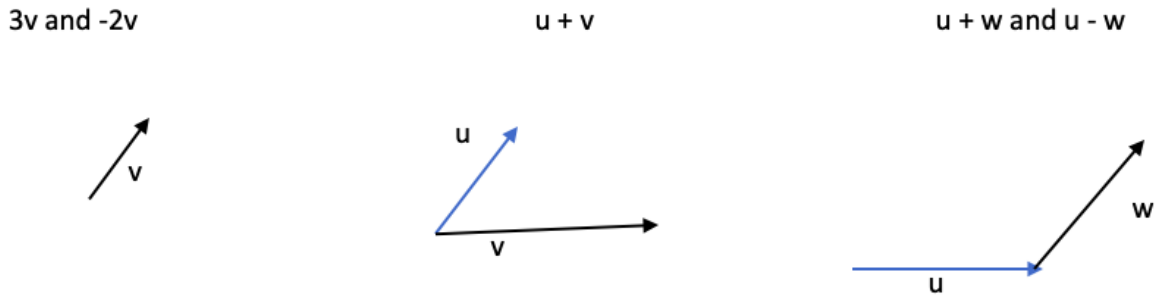
Example 1 (12.1)**.** *Let P, Q, and R be the projections of the point $S(3,5,7)$ onto xy-plane, yz-plane and xz-plane, respectively. Determine the coordinates of the points P, Q, and R, and compute the distance from the origin to the point S.*

Example 2 (12.1)**.** *(a) Sketch the graph of $x^2+y^2=9$ in $\mathbb{R}^2$.*
(b) Sketch the graph of $x^2+y^2=9$ in $\mathbb{R}^3$.
(c) Sketch the graph of $y^2+z^2=1$, $x \geq 2$ in $\mathbb{R}^3$.

Example 3 (12.1)**.** *Let the sphere S_1 is given by the equation $x^2 + y^2 + z^2 + 2x - 4z = 11$. Find the distance between the center of the sphere S_1 and the point $P(1, 4, 6)$.*

Example 4 (12.2)**.** *The initial point of a vector $\mathbf{v}$ in $\mathbb{R}^2$ is the origin and the terminal point is in the quad II. If $\mathbf{v}$ makes an angle of $\frac{2\pi}{3}$ with positive x-axis and $|\mathbf{v}| = 6$, find the vector $\mathbf{v}$.*

Example 5 (12.2)**.** *Draw the vectors as described below.*



Example 6 (12.2)**.** *Find the unit vectors that are parallel to the tangent line to the parabola* $y = x^2$ *at the point* $(4, 16)$.

Example 7 (12.3)**.** *If* $\mathbf{a} =< \mathbf{2}, \mathbf{-1}, \mathbf{0} >$, *find a vector* $\mathbf{b}$ *such that* $comp_{\mathbf{a}}\mathbf{b} = 3$.

Example 8 (12.3)**.** *Find the direction angles of the vector* $\mathbf{a} =< 1, 2, -1 >$.

Example 9 (12.3)**.** *Use vectors to determine whether the triangle with vertices* $A(3,2,0)$, $B(0,1,2)$ *and* $C(3,1,2)$ *is right-angled.*

Example 10 (12.3)**.** *Consider the triangle below is an equilateral triangle with* $|\mathbf{u}| = 1$*. Compute* $\mathbf{u} \cdot \mathbf{v}$ *and* $\mathbf{u} \cdot \mathbf{w}$.