

1. A molecule has atoms at the points $(0, 0, 0)$, $(2, 0, 0)$, $(1, \sqrt{3}, 0)$, and $(1, 1/\sqrt{3}, 2\sqrt{2/3})$. Verify that every atom is 2 units away from every other atom.
2. Which is traveling faster, a car whose velocity vector is $13\vec{i} + 5\vec{j}$, or a car whose velocity vector is $7\vec{i} + 12\vec{j}$?
3. Two planes are given by the equations $2x - 3y + 5z = 2$ and $4x + y - 3z = 7$.
 - (a) Find a vector parallel to the intersection of these two planes.
 - (b) Find the equation of the plane through the origin perpendicular to the line of intersection of these two planes.
 - (c) Find the equation of the plane through $(4, 5, 6)$ parallel to the plane in part (ii).
4. Find the length of the curve $\mathbf{c}(t) = (6t, 3t^2, t^3)$ for $0 \leq t \leq u$. Note that for this curve the expression for $\|\mathbf{c}'(t)\|$ can be simplified.
5. An object moves on a hyperbola with position $\mathbf{c}(t) = t^2\mathbf{i} + t^{-2}\mathbf{j}$. What is its velocity, speed, and acceleration when $t = 1$? What is the component of the acceleration in the direction of the velocity?
6. For the same curve, what is the curvature of the path when $t = 1$? What is the normal component of acceleration when $t = 1$?