In the calculus notes, Chapter 1, Section 12: 9, 10, 11, 12, 13, 14, 15(b, c, e), 16, and

A. Let \( P(x_0, y_0, z_0) \) and \( \vec{v} = \langle v_1, v_2, v_3 \rangle \), with \( \vec{v} \neq \vec{0} \) be given. Write down the distance from the point described by the parametric equations
\[ x = x_0 + v_1 t, \quad y = y_0 + v_2 t, \quad z = z_0 + v_3 t, \]
to another point \( S(a, b, c) \), as a function, \( d(t) \), of time. Use 221 tools and the formula for the cross product to show that the minimum value of \( d(t) \) equals
\[ d = \frac{|\vec{PS} \times \vec{v}|}{|\vec{v}|}. \]

B. Find the volume of the tetrahedron with corners at \( O(0,0,0), A(1,2,0), B(0,2,1), \) and \( C(1,0,1) \).

C. Let \( \vec{a} = \langle a_1, a_2 \rangle \) be a nonzero 2D vector and let \( \vec{u} = \langle u_1, u_2, u_3 \rangle \) be a nonzero 3D vector. Describe in words how you might find a nonzero 2D vector \( \vec{b} \) orthogonal to \( \vec{a} \) and a nonzero 3D vector \( \vec{v} \) orthogonal to \( \vec{u} \). Show that your approach works by finding vectors orthogonal to each of the following:
\[ \langle 1, -3 \rangle, \quad \langle 1, 0 \rangle, \quad \langle 0, 1 \rangle, \quad \langle 7, -1.5, 2 \rangle, \quad \langle 0, 1, 0 \rangle, \quad \langle 0, 0, -3 \rangle. \]

D. Find the distance from the origin to the plane containing \( P(1,0,0), Q(1,2,0), \) and \( R(0,0,-3) \).

E. Find the parametric equations for the line that passes through the origin and is orthogonal to the plane containing the points \( P(a,0,0), Q(0,b,0), \) and \( R(0,0,c) \) (\( a, b, c \neq 0 \)). At what point do this line and this plane intersect?

F. Do the vector equations \( \vec{r}(t) = \langle t, 2t, -t \rangle \) and \( \vec{s}(t) = \langle 1 + 2t, 2 + 4t, -1 - 2t \rangle \) describe the same line? Do the equations \( x + 2y - z = 3 \) and \( 2x + 4y - 2z = 4 \) describe the same plane?