Solve the following exercises. Show your work.

**Ex. 1.** Write the parametric equations of the line that passes through the point \( P(11, 13, -7) \) and is perpendicular to the plane with the equation: \( x - 2z = 17 \).

**Ex. 2.** Find the volume of the pyramid with the vertices: \( P(3, 2, -1), Q(-2, 5, 1), R(2, 1, 5), \) and the origin \( O(0, 0, 0) \).

**Ex. 3.** Describe in geometric terms the graph of the following equation. Be specific.
\[
2x^2 + 2y^2 + 2z^2 = 7x + 9y + 11z.
\]

**Ex. 4.** Find the curvature \( \kappa \) of the curve with position vector \( r(t) = i \cos t + j \sin t + 2t k \).

**Ex. 5.** Let \( a = \langle 0, 1, 2 \rangle, \ b = \langle -1, 0, 7 \rangle, \) and \( c = \langle 2, 3, -1 \rangle \). Evaluate: \( 2a - b + c, \ |c|, \) and \( (a \cdot b) \cdot (b \times c) \).

**Ex. 6.** Let \( v(t) = i(t + 1)^{-1} + kt^3 \) be a velocity of a particle. Find the acceleration vector \( a(t) \) of the particle and its position vector \( r(t) \), where its initial position was \( r_0 = 3i \).

**Ex. 7.** Find the the arc length, \( s \), of the curve with position vector \( r(t) = 2e^t \ i + 2t \ j + e^{-t} \ k \) from \( t = 0 \) to \( t = 1 \).

**Ex. 8.** State and graph the largest possible domain of the function \( h(x, y) = \sqrt{y - x^2} \).

**Ex. 9.** Describe and sketch the graph of the equation: \( 4z^2 = x^2 + y^2 \).

**Ex. 10.** Convert the equation: \( x^2 + y^2 + 2z^2 = 1 \) to the cylindrical and spherical coordinates.