1. Find the equation of the plane that passes through the points (1,2,2) and \((-1,1,3)\) and is parallel to the line \(x = 1 + 2t, y = 4 - t, z = 3t\).

2. Let \(f(x) = \sin(x^3)\). Find the 99th derivative of \(f\) evaluated at 0. That is, find \(f^{(99)}(0)\).

3. Find the point on the ellipse \(\frac{x^2}{4} + \frac{y^2}{9} = 1\) that is farthest from the line \(2x + y = 10\).

4. Let \(C_1\) be the solid cylinder in 3-dimensional space consisting of all points whose distance from the \(x\)-axis is not greater than 6. Let \(C_2\) be the solid cylinder consisting of all points whose distance from the \(y\)-axis is not greater than 6. If \(V\) is the intersection of \(C_1\) and \(C_2\), find the volume of \(V\). (Hint: If \(T\) is a plane parallel to the \(xy\)-plane, what does the intersection of \(T\) with \(V\) look like?)

5. Let \(f\) be a 3rd degree polynomial. That is, \(f(x) = ax^3 + bx^2 + cx + d\) where \(a \neq 0\). Show that there is at least one number \(x_0\) such that \(f(x_0) = 0\).