Math 2313, Test I

Name ___________________________

1. Find the equation of the plane:

   a. perpendicular to the line \( x = 1 - 3t, y = -2 + 4t, z = -1 + 2t \) and through the point \((1, 2, -2)\).
   answer: \(-3x + 4y + 2z = 1\)

   b. through the points \((0, 1, 0), (2, 1, 1), (0, 2, 1)\).
   answer: \(x + 2y - 2z = 2\)

2. Find the equations of the normal line to the plane \(2x + y - z = 3\) through the point \((1, 3, 2)\).
   answer: \(x = 2t + 1, y = t + 3, z = -t + 2\)
3. Find the volume of the parallelopiped with edges $< 2, 0, 4 >$, $< 0, 1, 2 >$ and $< -1, 2, 0 >$

    answer: 4

4. a. If $r(t) = < t^4, t^3, t^2 >$, find the velocity vector, $r'(t)$, and the acceleration vector $r''(t)$.
    
    answer: $r'(t) = < 4t^3, 3t^2, 2t >$, $r''(t) = < 12t^2, 6t, 2 >$

    b. Find parametric equations for the tangent line to the curve of part a, at $(1, 1, 1)$.
    
    answer: $x = 1 + 4t$, $y = 1 + 3t$, $z = 1 + 2t$

    c. Set up an integral which gives the length of the curve of part a, from $(1, 1, 1)$ to $(16, 8, 4)$. Do not evaluate the integral.
    
    answer: $\int_1^{16} \sqrt{16t^6 + 9t^4 + 4t^2} dt$