1. Write the equation of the plane through the origin that is normal to $\langle 3, -4, 1\rangle$.
2. (a) White the equation of the line perpendicular to the plane in the previous problem and passing through $(1, 1, 1)$.
   (b) Write the equation of the line passing through $(1, 1, 1)$ and $(9, -3, 4)$.
   (c) Are these two lines parallel?
3. Write the equation of the tangent plane to $x^2 + 2y^2 + 2z^2 = 7$ at $(\sqrt{2}, 1, 1)$.
4. Find the linear and quadratic approximations to $f(x, y) = 3x^2y - 4xy + 9y^4 + 2$ at the point $(1, 1)$.
5. (a) Find the velocity and acceleration of a particle traveling along $\vec{s}(t) = \langle 3t^2 + 1, 4t, \sin t\rangle$.
   (b) On the diagram below, label $\vec{v}$, $\vec{a}$, $\vec{\kappa}$, $\vec{T}$, and $\vec{N}$ on the curve at points A and B.

6. Compute $\dfrac{\partial h}{\partial x}$ and $\dfrac{\partial h}{\partial y}$ if $h(x, y) = f(u, v, z)$, where $u = 3x + 2$, $v = 9y + x^2$, and $z = 3xy$.
7. Compute $\dfrac{\partial h}{\partial x}$ and $\dfrac{\partial h}{\partial y}$ if $h(x, y) = f(x^2 + y^2 + 2xy)$ and $f(t)$ is a function of one variable.
8. Write a parametric equation for the curve $y = 2x^2 + \sqrt{x}$.
9. Find and classify all critical points of $f(x, y) = 3x^3 - 9xy^2 + 4x - 2$
10. Find the global extrema of $f(x, y)$ (from the previous problem) on $x^2 + y^2 \leq 1$.