1. If \( \vec{r}(t) = \langle -4 \cos 2t, 3, 4 \sin 2t \rangle \) and \( \vec{r}(0) = \langle 1, 2, 3 \rangle \), find \( \vec{r}'(t) \).
   
   b. Write the parametrized equations for the tangent line to this curve at \( t = 0 \), passing through the point \( P(1,2,3) \).

   c. Evaluate the unit tangent vector \( \vec{T}(t) \) for this curve \( \vec{r}(t) \) of part a).

   d. Evaluate the acceleration vector \( \vec{a}(t) = \vec{r}''(t) \) for this curve.

   e. Evaluate the scalar component of the acceleration along the direction of motion (the tangential acceleration): \( a_{\parallel}(t) \).

   f. Evaluate the length of this curve for \( 0 \leq t \leq 1 \). (Call it \( L \).)

2. Given the three points \( P(1,2,3), Q(2,3,1), R(3,2,0) \)
   
   a. Write the equation for the plane containing these points (simplify).

   b. Evaluate the area of the triangle formed by these three points.

   c. Write the parametrized equations for the line through \( P \) which is perpendicular to the plane.

   d. How far is this plane from the origin? (Project \( \vec{OP} \) along the normal direction.)

   e. What angle does \( \vec{OP} \) make with the normal direction to the plane? (Choose an acute angle rather than an obtuse angle.) (Exact result good enough here — no need for technology.)

3. Let \( f(x,y) = \sqrt{6x-2y+3z-12} \). Describe the domain of \( f \) and use a rough 3D diagram to help explain.

4. Reread each part of each problem and see whether your response covers everything that was requested. Did you box short final responses requested (and no others)?