Math 2313, Test I

Name _____

1. Find the equation of the plane through $(0, 0, 1)$ and parallel to both of the lines $x = -1 + 2t, y = -2, z = 3 + 4t$ and $x = 2 - t, y = 2 + 2t, z = -3 + t$.

   answer: $-8x - 6y + 4z = 4$

2. Consider the two planes $2x + 4z = 12$ and $-x + 2y + z = 25$.

   a. Find a vector parallel to the line of intersection of these planes.
      answer: $(-8, -6, 4)$

   b. Find the angle between the two planes (at the intersection)
      answer: $\theta = 79.5^o$ (or 100.5^o)

3. Find the area of a triangle with edges $< 2, 0, 4 >$ and $< -1, 2, 1 >$.
   answer: $\sqrt{29}$

4. If $r(t) =< \cos(t^2), \sin(t^2), t^2 >$, find the arc length from $t = 0$ to $t = 2$.
   answer: $4\sqrt{2}$

5. Find parametric equations for the tangent line to the curve of problem 4, at the point $(-1, 0, \pi)$.
   answer: $x = -1, y = -2\sqrt{\pi}t, z = \pi + 2\sqrt{\pi}t$

6. If $r'' =< t, t^2, t^3 >$ and $r(0) =< 5, 6, 7 >, r'(0) =< 2, 3, 4 >$, find $r(t)$.
   answer: $< t^3/6 + 2t + 5, t^4/12 + 3t + 6, t^5/20 + 4t + 7 >$