Math 2313, Test I

Name _____

1. Find the equations (parametric or symmetric) of the line:

   a. perpendicular to the plane $2x + 3y - z - 5 = 0$ and through the point $(1, 2, 3)$
   answer: $x = 1 + 2t, y = 2 + 3t, z = 3 - t$ or $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{-1}$

   b. through the points $(0, 1, 1), (2, 0, 3)$.
   answer: $x = 2t, y = 1 - t, z = 1 + 2t$ (many other forms possible)

2. a. Find the area of the triangle with vertices $(0, 0, 0), (3, 1, 0), (-3, 2, 1)$.
   answer: $\sqrt{91}/2$

   b. Determine if this is an acute, obtuse or right triangle. Justify your answer.
   answer: obtuse

3. If $r(t) =< \frac{1}{3}t^3, \frac{1}{2}t^2, \frac{1}{2}t^2 >$, find the velocity and acceleration vectors, $r'(t), r''(t)$ and find the magnitude of the velocity, $||r'(t)||$.
answer: $r'(t) =< t^2, t, t >, r''(t) =< 2t, 1, 1 >, \|r'(t)\| = |t|\sqrt{t^2+2}$

4. Find the length of the curve of problem 3, from $t = 0$ to $t = 2$.
answer: 3.956

5. Find parametric equations for the tangent line to the curve of problem 3, at the point $(9, \frac{9}{2}, \frac{9}{2})$.
answer: $x = 9 + 9t, y = \frac{9}{2} + 3t, z = \frac{9}{2} + 3t$

6. If $r''(t) =< 0, cos(t) >, r(0) =< 1, 1 >$ and $r'(0) =< 0, 0 >$ find $r(t)$.
answer: $r(t) =< 1, 2 - cos(t) >$