Math 2313, Test I

Name ____________________________

1. Find the equation of the plane:

   a. perpendicular to the line $x(t) = -2 + 2t, y(t) = 3, z(t) = 3 - 4t$ and through the point $(0, 1, -1)$
   answer: $2(x - 0) + 0(y - 1) - 4(z + 1) = 0$, or $2x - 4z = 4$

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

2. Consider the two planes $x + y - z = 3$ and $-x + 2y - z = 2$.

   a. Find the angle between the two planes where they intersect.
   answer: 61.9^o. (or 118.1^o)

   b. Find a vector parallel to the line of intersection of the two planes.
   answer: $< 1, 2, 3 >$

3. a. Convert the equation $x^2+y^2+(z-1)^2 = 1$ to spherical coordinates and simplify.
answer: $\rho = 2cos(\phi)$

b. Find the cylindrical coordinates for $(-2\sqrt{2}, 2\sqrt{2}, 2)$.
answer: $r = 4, \theta = 135^o, z = 2$

4. If $r(t) =< e^{2t}, sin(3t), \frac{1}{2}t^2 >$, find the velocity vector $r'(t)$ and the acceleration vector $r''(t)$.
answer: $r'(t) =< 2e^{2t}, 3cos(3t), t >, r''(t) =< 4e^{2t}, -9sin(3t), 1 >$

5. Set up an integral to compute the length of the curve of problem 4, from $t = 0$ to $t = 2$. Do not try to evaluate the integral!
answer: $\int_0^2 \sqrt{4e^{4t} + 9cos^2(3t) + t^2}\ dt$

6. Find parametric equations for the tangent line to the curve of problem 4, at $t = 0$.
answer: $x = 1 + 2t, y = 3t, z = 0$