MATH 250

Test 1

October 2, 2006

Name:

- No books or calculators are allowed.

- Please show all your work.

- Please simplify your answers.

- Each problem is worth 10 points.

1. Let $v = <9, 5, 1>$ and $u = <1, -2, 1>$. Find the following:

   (a) $v \cdot u$,

   (b) the angle between v and u.

2. Find an equation of the plane that passes through the point $(5, 4, 3)$ and is parallel to the plane $x - y + z = 0$.

3. Find equations of the line that passes through points $(0, 1, 2)$ and $(1, 2, 4)$.

4. Find and descibe the domain of $f(x, y, z) = \ln(1 - x^2 - y^2 - z^2)$.

5. Consider the curve given by $r(t) = < t^2, t^3 + t^2, t^3 >$.

   (a) Find $r'(t)$.

   (b) Is this curve smooth? Explain why or why not.

6. (For extra credit) Find the point on the plane $2x + 3y + 4z + 5 = 0$ closest to the point $(1, 1, 1)$.