Math 126 D - Spring 2011
Mid-Term Exam Number One
April 26, 2011

Name: _____   Student ID no. : _____

Signature: _____   Section: _____

1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

- Complete all questions.

- You may use a scientific, non-graphing calculator during this examination. Other electronic devices are not allowed, and should be turned off for the duration of the exam.

- If you use a trial-and-error or guess-and-check method when an algebraic method is available, you will not receive full credit.

- You may use one hand-written 8.5 by 11 inch page of notes.

- Show all work for full credit.

- You have 50 minutes to complete the exam.

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1. Find the equation of the plane which contains the point $(3, 2, 1)$ and the line of intersection of the planes

$$x + 2y - z = 5$$

and

$$2x - y + 4z = 1.$$

2. Consider the curve C defined by the vector function $\vec{r}(t) = \langle t^3, t^2, \frac{1}{t} \rangle$.

   Find the curvature of C at the point $(8, 4, \frac{1}{2})$.

3. A particle moves in three-dimensional space. Its position at time $t > 0$ is given by the vector function
$$\vec{r}(t) = \langle 3t^2, \frac{2}{t}, 5t + 2 \rangle.$$

(a) At what value(s) of t is the speed of the particle a minimum?

(b) Find the tangential component of this particle's acceleration vector at time $t = 1$.

4. Find all points on the curve
$$x = 3t^2 + 2t, \quad y = 5t^2 - t$$
at which the tangent line to the curve passes through the point $(0, -4)$.

You only need to specify the t values of these points, not their coordinates.

5. Find the area of the triangle with vertices $(0, 1, 2)$, $(-1, 2, -1)$ and $(3, 2, 1)$.