Math 126G - Spring 2002
Second Mid-Term Exam
May 23, 2002

Name _____ Section _____

1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
Total	60	

- Complete all questions.
- You may use a calculator during this examination. Other calculating devices are not allowed.
- 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.

1. (10 points) Indicate whether each of the following statements is true or false by circling T or F.

   T F If $\vec{a} \cdot \vec{b} = 0$, then $\vec{a}$ and $\vec{b}$ are parallel.

   T F $\langle a, 0, 0 \rangle \times \langle 0, b, 0 \rangle = \langle 0, 0, ab \rangle$.

   T F If $ab = 1$, then $\langle a, 1, 1 \rangle \times \langle 1, b, 1 \rangle = \langle 1 - b, 1 - a, 0 \rangle$.

   T F If $\vec{a} \cdot \vec{b} = 0$ then either $\vec{a}$ or $\vec{b}$ is the zero vector.

   T F A plane has an infinite number of vectors which are perpendicular to it.

2. (10 points) Determine the Taylor polynomial of degree 3 for the function $f(x) = (2x + 1)^{2/3}$ centered at $a = 0$.

3. (10 points) Find the equation of the plane containing the line

$$x = 3 + t, y = 4 - 2t, z = 1 - t$$

and the point $(1, 2, 5)$.

4. (10 points) Consider the space curve defined by

$$\vec{r}(t) = \langle 4t^3 + 12t^2,\ 4t^3 - 6t^2,\ 3t^4 - 18t^2 \rangle.$$

Find all values of t such that a tangent vector to $\vec{r}(t)$ is parallel to the line

$$x = 5 - 2t,\ y = 8 + 4t,\ z = -7 - 4t.$$

5. (10 points) Consider the curve defined by the parametric equations

$$x = t^3 + 5t,\ y = t^3 - 12t.$$

(a) Find all points on the curve where $\dfrac{dy}{dx} = 0$.

(b) Find the concavity $\dfrac{d^2y}{dx^2}$ at each of the points you found in part (a).

6. (10 points) Find the equation of the line that is the intersection of the plane

$$x + y + 3z = 8$$

with the plane

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