Math 126G   **First Midterm**   **Spring 2013**

Your Name   Your Signature

Student ID #

| | | | | | | |

Josh   Dake

Section   2:30   1:30   2:30   1:30

(circle one)   GA   GB   GC   GD

Problem	Total Points	Score
1	8	
2	7	
3	10	
4	7	
5	8	
6	10	
Total	50	

- This exam is closed book. You may use one $8\frac{1}{2} \times 11$ sheet of notes.

- Graphing calculators are not allowed.

- Do not share notes.

- In order to receive credit, you must show your work. Explain why your answers are correct.

- **Place a box around** $\boxed{\text{YOUR FINAL ANSWER}}$ **to each question.**

- If you need more room, use the backs of the pages and indicate to the reader that you have done so.

- Raise your hand if you have a question.

1 (7 points)   Let $\mathbf{r}(t) = \dfrac{3}{1+t^2}\,\mathbf{i} + \dfrac{2t}{1+t^2}\,\mathbf{j}$. Calculate the integral $\displaystyle\int_0^1 \mathbf{r}(t)\,dt$. Give your answer in exact form.

2 (8 points)   Consider the curve in $\mathbf{R}^2$ with parametric equations $x = 4t^2 + t + 1, \quad y = t^4 + 2t.$

Give the coordinates of the points on the curve where the tangent line has slope 2.

3 (10 points)   Consider the curves $\mathbf{r}_1(t) = \langle t + 1, t^2 + 3, 3t + 1 \rangle$ and $\mathbf{r}_2(s) = \langle s + 4, s^2, -2s \rangle$.

(a) (5 points)   At what point do the curves intersect?

(b) (5 points)   Find the (acute) angle of intersection, correct to the nearest degree.

4 (7 points)   Calculate the area of the triangle in $\mathbf{R}^3$ with vertices $(-1, 1, 1)$, $(1, 1, 2)$ and $(-1, 4, 3)$.

5 (8 points)   Let ℓ be the line $\mathbf{R}^3$ that passes through the points $(1, 2, 3)$ and $(4, 1, -1)$. Find the coordinates of the point where ℓ intersects the xz-plane.

6 (10 points)   Find an equation of the plane that passes through the points $(0, -1, 1)$ and $(2, -1, 2)$ and is perpendicular to the plane $x + y = z$.