Math 126D **Exam Two Makeup** **Summer 2002**

Your Name

Your Signature

Student ID #

Problem	Total Points	Score
1	14	
2	10	
3	12	
4	14	
Total	50	

- This exam is closed book. You may use one $8\frac{1}{2} \times 11$ sheet of notes.
- Do not share notes.
- Calculators are not allowed.
- In order to receive credit, you must show your work. You must also justify all conclusions you make. Do not assume something is obvious. If you feel something is clear enough to not necessitate algebra, write a sentence or two explaining your reasoning. Do not do computations in your head. Instead, write them out on the exam paper.
- 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 (14 points) Consider the points

$$P = (1, 1, 0),\ Q = (-1, 2 - 1),\ R = (2, 1, 3), \text{ and } S = (3, 0, -2).$$

Find the distance from the point P to the plane which contains Q, R, and S.

2 (10 points) Find the fourth degree Taylor polynomial for $f(x) = \ln(\sin x)$ centered at $x = \frac{\pi}{2}$.

3 (12 points) Consider the vectors

$$\vec{a} = < 1, 0, 0 > , \vec{b} = < \frac{1}{2}, \frac{\sqrt{3}}{2}, 0 > , \text{ and } \vec{c} = < \frac{1}{2}, \frac{1}{2\sqrt{3}}, \sqrt{\frac{2}{3}} >$$

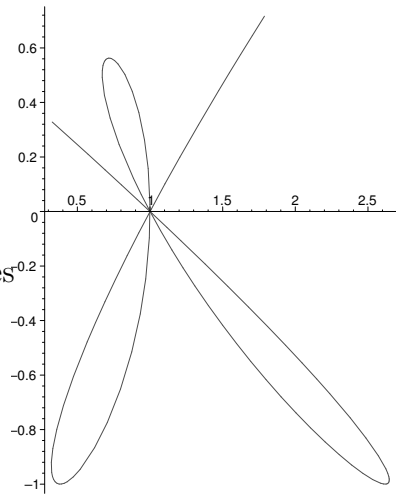
(a) (6 points) Find the angle between $\vec{a}$ and $\vec{a} + \vec{b}$. Find the angle between $\vec{b}$ and $\vec{a} + \vec{b}$.

(b) (3 points) Find the magnitude of the vector $\vec{c}$ in the direction of $\vec{a} + \vec{b}$.

(c) (3 points) Find the volume of the parallelepiped spanned by the vectors $\vec{a}$, $\vec{b}$, and $\vec{c}$.

4 (14 points) Consider the following parametric equation:

$$\begin{aligned} x(t) &= -t^5 + 2t^4 + t^3 - 2t^2 + 1 \\ y(t) &= t^4 - 2t^3 - t^2 + 2t. \end{aligned}$$



(a) (8 points) Find the equations for each of the tangent lines to this parametric equation through the point (1,0).

(b) (6 points) Find the area contained inside one of the loops of the equation. You only need to find it for one loop. You may like to know that $\frac{dx}{dt} = 0$ when $t = -0.73$, $t = 0$, $t = 0.66$, and $t = 1.67$.