Exam IV, Spring 2007

Name:_____

Signature:_____

Show all your work and give reasons for your answers. Good luck!

Part I All problems in part I are worth 10 points each.

(1) Find the angle between the vectors $< 1, 2, 3 >$ and $< 1, 1, 1 >$. Also find the area of the parallelogram spanned by these vectors.

(2) Find the equation of the line through the points $(1, 2, 3)$ and $(1, 1, 1)$.

(3) Find the equation of the plane which goes through the point $(1, 3, -2)$ and is perpendicular to the line

$$\begin{cases} x = 1 + t \\ y = 2 - t \\ z = 2 + 2t \end{cases}$$

(4) Find the distance of the point $(1, 2, 3)$ to the plane $3x - y + z = 5$

(5) Determine if the vectors $< 1, 2, 3 >$, $< -1, 0, 3 >$ and $< 0, 1, 5 >$ are co-planar. [As always, you must justify your answer.]

(6) Express $f(x) = \cos(x^3)$ as a series. **Include the interval of convergence.**

Part II Problem in Part II are worth 20 points.

(7) Determine if the following lines are skew, parallel or intersect.

$$\ell_1 : \begin{cases} x = 1 + 3t \\ y = -1 - t \\ z = 2 + 3t \end{cases} \quad \text{and} \quad \ell_2 : \begin{cases} x = 0 + 3s \\ y = 4 + s \\ z = 2 - s \end{cases}$$

(8) Use series to approximate the value of $\int_0^{(1/10)} e^{-x^2}\,dx$ with an error less than 10^{-9}. [You don't need to compute or add the terms in the sum. However, clearly state your answer and the error.]