MAC 2313, Section 04 with Dr. Hurdal
Fall 2011 – Assignment 1

Due: Tuesday September 27, 2011 at the beginning of class.

With your group (3-4 people per group), please hand in complete written solutions (1 solution set per group in one hand writing) for the following questions. Points will be allocated for clear and well written mathematical solutions.

In addition to your group solutions, you will individually hand in a typed log which you sign, that includes when your group met and who was there, when you worked on the problems by yourself and who wrote up the final assignment solutions. Your log should also rank each member of your group (including yourself) with a percentage contribution to the assignment. This log will be kept confidential by me so if you have any group dynamic concerns, then this is a place where you can write your comments. Individuals who do not submit a typed log will have points deducted. It is not guaranteed that every group member will get the same grade.

Homework must be stapled to be accepted.

1. Find the unit tangent, unit normal and unit binormal vectors and curvature of $\mathbf{r}(t) = \langle \cos t + t \sin t, \sin t - t \cos t, 3 \rangle$ at $P(-1, \pi, 3)$.

2. At what point does the curve $y = \ln x$ have maximum curvature? What is the maximum curvature? What happens to the curvature as $x \to \infty$?

3. Find parameteric equations for the line that is tangent to the curve $\mathbf{r}(t) = \langle \cos t, \sin t, \sin(2t) \rangle$ at $t = \dfrac{\pi}{2}$.

4. Given $\mathbf{r}(t) = \left\langle \arctan t, e^{-2t}, \dfrac{\ln t}{t} \right\rangle$, find $\lim\limits_{t \to \infty} \mathbf{r}(t)$, $\mathbf{r}'(t)$, and $\displaystyle\int \mathbf{r}(t)\, dt$.