MAT 175 HOMEWORK #4

DUE MARCH 8 (WEDNESDAY)

Note: *Please* **staple** *if necessary. Numbering of problems is as in the textbook.*

(11.5.**6**) Find the required limit or indicate that the limit does not exist.

$$\lim_{t\to\infty}\left[\frac{t\sin t}{t^2}\,\mathbf{i}-\frac{7t^3}{t^3-3t}\,\mathbf{j}-\frac{\sin t}{t}\,\mathbf{k}\right]$$

(11.5.**10(a)**) State the domain of the following vector-valued function:

$$\vec{r}(t)=\ln(t-1)\mathbf{i}+\sqrt{20-t}\,\mathbf{j}$$

(11.5.**14(a)**) Find $\mathbf{r}'(t)$ and $\mathbf{r}''(t)$, where

$$\mathbf{r}(t)=(e^t+e^{-t^2})\mathbf{i}+2^t\mathbf{j}+t\mathbf{k}$$

(11.5.**40**) Find $\mathbf{F}'(t)$ in terms of t, where $\mathbf{F}(t)=\mathbf{f}(u(t))$ with

$$\mathbf{f}(u)=u^2\mathbf{i}+\sin^2(u)\mathbf{j}\quad\text{and}\quad u(t)=\tan t$$

(11.5.**42**) Evaluate the integral

$$\int_{-1}^{1}\left[(1+t)^{3/2}\mathbf{i}+(1-t)^{3/2}\mathbf{j}\right]\,dt$$

(11.6.**2**) Find the parametric equations of the line through the points $(2,-1,-5)$ and $(7,-2,3)$.

(11.6.**6**) Write both the parametric equations and the symmetric equations for the line through the point $(-1,3,-6)$ parallel to the vector $\langle -2,0,5\rangle$.

(11.6.**10**) Find the symmetric equations of the line of intersection of the given two planes:

$$x+y-z=2,\quad 3x-2y+z=3$$

(11.6.**18**) Show that the lines

$$\frac{x-1}{-4} = \frac{y-2}{3} = \frac{z-4}{-2}$$

and

$$\frac{x-2}{-1} = \frac{y-1}{1} = \frac{z+2}{6}$$

intersect, and find the equation of the plane that they determine.

(11.6.**24**) Find the parametric equations of the line tangent to the curve

$$x = 2t^2, \quad y = 4t, \quad z = t^3$$

at $t = 1$.