Due on May 5, 2006, Friday, Class time. No late submissions!

MATH 114 Homework 8

1: Calculate $\int_C \mathbf{F}\cdot\mathbf{T}\, ds$, where $\mathbf{F} = x\mathbf{i}+y^2\mathbf{j}+z^3\mathbf{k}$, and C is the helix $\cos t\ \mathbf{i}+\sin t\ \mathbf{j}+t\ \mathbf{k}$, $0 \le t \le \pi$.

2: Calculate $\int_C \mathbf{F}\cdot\mathbf{n}\, ds$, where $\mathbf{F} = (x^2-1)\mathbf{i}+(y+2)\mathbf{j}$, and C is that part of the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$ lying in the upper half plane and traversed clockwise.

3: Calculate $\int_C \mathbf{F}\cdot\mathbf{T}\, ds$, where $\mathbf{F} = (e^x\cos y + yz)\mathbf{i}+(xz-e^x\sin y)\mathbf{j}+(xy+z)\mathbf{k}$, and C is the path $(\cos t+\sin^2 t)\ \mathbf{i}+(\sin t+1+\ln(1+\sin^2 t))\ \mathbf{j}+|\cos t|\sqrt{2-2\sin t}\ \mathbf{k}$, $0\le t\le\pi$.

4: Calculate $\int_C \mathbf{F}\cdot\mathbf{n}\, ds$, where $\mathbf{F} = \arctan(y/x)\ \mathbf{i}+\ln(x^2+y^2)\ \mathbf{j}$, and C is the positively oriented boundary of the region described in polar coordinates by the inequalities $1 \le r \le 2$ and $0 \le \theta \le \pi/2$.

5: Find the area of the closed figure parameterized by $\cos^3\theta\ \mathbf{i}+\sin^3\theta\ \mathbf{j}$, $0\le\theta\le 2\pi$.