Exam 3.

Evaluate the line integral $\int_C (x^2+y^2)dx + 2xydy$ where the curve C is the circle $x^2+y^2=5$ oriented counterclockwise.

The surface S is represented by the function $\mathbf{r}(u,v) = (u+v)\vec{i} + (u-v)\vec{j} + sinv\vec{k}$ where $0 \leq u \leq 2, 0 \leq v \leq 2\pi$. Find the unit normal vector to this surface at the point $(1,1,0)$ and the equation of a tangent plane to the surface at this point.

Given vector fields $\mathbf{F}(x,y,z) = y^5 sinz\vec{i} + (y+cosx)\vec{j} + z\vec{k}$, and $n(x,y,z) = \frac{1}{(x^2+y^2+z^2)^{\frac{1}{2}}}(-x,-y,-z)$. Find the flux $\int_S \mathbf{F} \cdot dS$ where S is the unit sphere centered at origin.

Find the integral $\int_S curl\,\mathbf{F} \cdot dS$ where $\mathbf{F}(x,y,z) = (x^2+y)\vec{i} + y^2\vec{j} + z\vec{k}$ and the surface $S = \{(x,y,z)|z=0, x^2+y^2 \leq 1\}$.