HOMEWORK #5 (9.12 ~9.16)

Due on March 29

1) Proceed as in Example 6 (page 519) to evaluate the given line integral $\oint_c \frac{-y^3 dx + xy^2 dy}{(x^2+y^2)^2}$ where C is the ellipse $x^2 + 4y^2 = 4$ (Problem 25, page 521).

2) In the problem (Problem 25, page 528), evaluate $\iint_S (3z^2 + 4yz)dS$, where S is the portion of the plane $x + 2y + 3z = 6$ in the first octant. Use the portion of S onto the coordinate plane indicated in the given plane.

3) Use Stokes' theorem to evaluate $\oint_C \vec{F} \cdot d\vec{r}$ Assume C is oriented counterclockwise as viewed from above. $\vec{F} = y^3\vec{i} - x^3\vec{j} + z^3\vec{k}$; C is the trace of the cylinder $x^2 + y^2 = 1$ in the plane $x + y + z = 1$ (Problem 9, page 534).

4) Use the divergence theorem to find the outward flux $\iint_S (\vec{F} \cdot \vec{n})dS$ of the given vector filed $\vec{F} = x^3\vec{i} + y^3\vec{j} + z^3\vec{k}$; D the region bounded by the sphere $x^2 + y^2 + z^2 = a^2$ (Problem 3, page 550).