Calculus3 week 3 Problem set
(토요일 자정까지 제출)

1. Use Green's theorem to find the counterclockwise circulation for vector filed $\vec{F}$ along the curve C (that is, work done by $\vec{F}$ over the curve C).
 (a) $\vec{F}=(x^2+4y)\vec{i}+(x+y^2)\vec{j}$, C: The square bounded by x=0, x=1, y=0, y=1.
 (b) $\vec{F}=(x+y)\vec{i}-(x^2+y^2)\vec{j}$ C: The triangle bounded by y=0, x=1, y=x.

2. Use a parametrization to express the area of the surfaces given below as a double integral. Evaluate the integral.
(a) Plane inside cylinder: the portion of the place $x+z=0$ inside the cylinder $x^2+y^2=4$
(b) Parabolic cap: the cap cut from the paraboloid $z=2-x^2-y^2$ by the cone $z=\sqrt{x^2+y^2}$

3. Find the flux $\iint_S \vec{F}\cdot\vec{n}d\sigma$ across the surface in the given direction by direct computation.
(a) $\vec{F}=x\vec{i}+y\vec{j}+z\vec{k}$ across the sphere $x^2+y^2+z^2=4$ in the direction away from the origin.
(b) $\vec{F}=xy\vec{i}-z\vec{k}$ outward through the cone $z=\sqrt{x^2+y^2}$, $0\le z\le 1$.

4. Use the surface integral in Stokes' theorem to calculate the circulation of the vector filed $\vec{F}=x^2i+2xj+z^2k$ around the curve C: the circle $4x^2+y^2=4$ in the xy-plane, counterclockwise when viewed from above.

5. Use divergence theorem to find the outward flux of $\vec{F}=x^2i+y^2j+z^2k$ across the boundary of the region D: the cube cut from the first octant by the planes x=1, y=1, z=1.