Name ____________________

Homework 18
Section 19.4

1. (5) Consider the vector field $\vec{G} = (2x^2 + yz - y)\vec{i} + (y^2 - e^z + 2)\vec{j} - ((x+y)z)\,\vec{k}$ and the closed box whose base is in the xy-plane with vertices at $(-1,-1,0)$, $(1,-1,0)$, $(1,2,0)$, and $(-1,2,0)$ and which extends in the positive z direction to a height of 7. Compute the flux of $\vec{G}$ out of the box.

2. (5) Let S be the surface of the ice cream cone bounded between the graphs of $x^2 + y^2 + z^2 = 4$ and $z = \sqrt{x^2 + y^2}$, oriented outward. Compute $\oint_S \vec{F} \cdot d\vec{A}$, where

$$\vec{F} = \left(x^3 + 2xy^2\right)\vec{i} + \left(2y^3 - 3y + 2yx^2 - z\right)\vec{j} + \left(3z - 3y^2z + \frac{5}{3}z^3\right)\vec{k}$$

3. (5) Let $\vec{F}(x, y, z) = 3xy\vec{\imath} - x^2y\vec{\jmath} + (3z - y)\vec{k}$. Calculate the flux of $\vec{F}$ out of the *open top* box B which has one corner at the origin and extends 3 units in the positive x-direction, 4 units in the positive y-direction and 5 units in the positive z-direction.

4. (5) Determine the flux of $\vec{G}(x,y,z) = (x^3z + x - y)\,\vec{\imath} + (x^2yz - 4y^2)\,\vec{\jmath} + (8yz - z - x^2z^2)\,\vec{k}$ into the closed surface S which is the cone $z = \sqrt{x^2+y^2}$ bounded below the plane $z = 2$, along with the disk on the top which closes the surface.