Name _____

Homework 19
Sections 19.4 & 20.1

1. (6) Let W be the solid which is bounded below the graph of $z = 12 - 4x - 2y$ in the first octant, and let S be the surface which is the boundary of W. That is, S is comprised of 4 triangular faces – one in each of the coordinate planes, and one which is the portion of the plane $z = 12 - 4x - 2y$ in the first octant. Determine the flux out of S of $\vec{F} = (x^2 + 3x + y^2)\,\vec{i} + (4y + z^3 - xy)\,\vec{j} + (8xy - 5z)\,\vec{k}$.

2. (5) Compute the curl of $\vec{H} = \left(\frac{y^2}{z} + xyz\right)\vec{i} + \left(\tan^{-1} y\right)\vec{j} + (yz\cos(x))\,\vec{k}$ at the point $(0, -6, 2)$.

3. (4) Let curl$\vec{F} = (2xy + z + 4)\vec{i} - y^2\vec{j} + (11y - 5x^2)\vec{k}$ and let C be the square of side length 0.01 centered at $(2, 3, 4)$ in the plane $2x + y + 2z = 15$, oriented clockwise when viewed from the origin. Use this information to approximate $\int_C \vec{F} \cdot d\vec{r}$.

4. (5) Let $\vec{F} = (x^2 + xyz)\vec{i} + (y + xz)\,\vec{j} + (zx^3y^2)\,\vec{k}$ and $\vec{G} = \text{curl}\vec{F}$. Determine $\text{curl}\vec{G}(1, 2, 3)$.