DIRECTIONS To receive full credit, you must provide complete legible solutions to the following problems in the space provided. No Attached papers. Transfer all your answers to the space provided.

1. Verify that the Divergence Theorem is true for the vector field **F** on the region E. Give the flux.
$\mathbf{F}(x, y, z) = 2x\mathbf{i} + xy\mathbf{j} + 4xz\mathbf{k},$ Ans____________
E is the cube bounded by the planes x = 0, x = 2, y = 0, y = 2, z = 0, and z = 2.

2. Use the Divergence Theorem to calculate the surface integral that is, calculate the flux of **F** across S. $\mathbf{F}(x, y, z) = x^2 \sin y\mathbf{i} + x\cos y\mathbf{j} - xz\sin y\mathbf{k}$, S is the "fat sphere" $x^8 + y^8 + z^8 = 8$. Ans____________

3. Let $\mathbf{F}(x,y,z) = z\tan^{-1}(y^2)\mathbf{i} + z^3\ln(x^2+3)\mathbf{j} + z\mathbf{k}$ Find the flux of F across S, the part of the paraboloid $x^2 + y^2 + z = 5$, that lies above the plane $z = 4$ and is oriented upward.

Ans__________

4. Use the Divergence Theorem to calculate the surface integral the flux integral $\iint_S \left(e^{x\sin} y\mathbf{i} + e^{x\cos y}\mathbf{j} + yz^2\mathbf{k}\right)\bullet d\mathbf{S}$, where S is is the surface of the box bounded by the planes x = 0, x = 1, y = 0, y = 3, z = 0, and z = 1.

Ans________