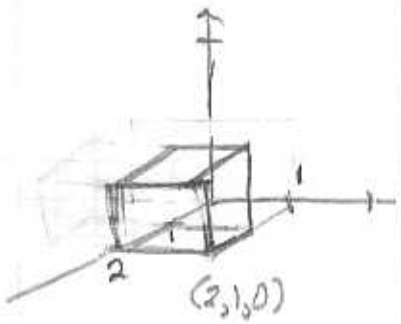
Page 899 #3

$\vec{F} = x^2\vec{i} + 2y^2\vec{j} + 3z^2\vec{k}$



$1 \le x \le 2$
$0 \le y \le 1$
$0 \le z \le 1$

Flux (From Ch 19)

$$\text{Flux} = \vec{F} \cdot \vec{n}\, A$$

Front: Flux $= \vec{F} \cdot \vec{L}\,(1) = x^2(1) = 4$

Back: " $= \vec{F} \cdot (-\vec{L})(1) = -x^2(1) = -1$

Top: " $= \vec{F} \cdot (\vec{k})(1) = 3z^2(1) = 3$

Bottom: " $= \vec{F} \cdot (-\vec{k})(1) = -3z^2(1) = 0$

Rt side: " $= \vec{F} \cdot (\vec{j})(1) = 2y^2(1) = 2$

Lft side: " $= \vec{F}(-\vec{j})(1) = -2y^2(1) = 0$

Total Flux $= 8$

Flux (From Ch 20)

$$\text{Flux} = \iint_S \vec{F} \cdot d\vec{A} = \iiint_W \operatorname{div} \vec{F}\, dV$$

$$= \iiint_W (2x + 4y + 6z)\, dV$$

$$= \int_0^1 \int_0^1 \int_1^2 (2x + 4y + 6z)\, dx\, dy\, dz = \int_1^2 \int_0^1 \int_0^1 (2x + 4y + 6z)\, dz\, dy\, dx$$

Either Way: Answer 8