7. $\iint_S F \cdot N \, dS$ $\quad F(x,y,z) = 8z\vec{i} - 8\vec{j} + y\vec{k}$ $\quad S: x+y+z=5$ 1ST OCTANT

$x+y+z=5$

$z = 5-x-y$

$g(x,y) = 5-x-y$

$g_x = -1 \quad g_y = -1$

y's

$z = 5-x-y$

$0 = 5-x-y$

$y = 5-x$

$$= \int_{x=0}^{x=5} \int_{y=0}^{y=5-x} (8z\vec{i} - 8\vec{j} + y\vec{k}) \cdot (\vec{i} + \vec{j} + \vec{k}) \, dy \, dx$$

x's

$y = 5-x$

$0 = 5-x$

$x = 5$

$$= \int_{x=0}^{x=5} \int_{y=0}^{y=5-x} (8z - 8 + y) \, dy \, dx$$

$$= \int_{x=0}^{x=5} \int_{y=0}^{y=5-x} (8(5-x-y) - 8 + y) \, dy \, dx$$

$$= \int_{x=0}^{x=5} \int_{y=0}^{y=5-x} (32 - 8x - 7y) \, dy \, dx$$

$$= \int_{x=0}^{x=5} \left[32y - 8xy - \frac{7}{2}y^2 \right]_{y=0}^{y=5-x} dx$$

$$= \int_{x=0}^{x=5} \left[32(5-x) - 8x(5-x) - \frac{7}{2}(5-x)^2 \right] dx$$

$$= \int_{x=0}^{x=5} \left[160 - 32x - 40x + 8x^2 - \frac{7}{2}(25 - 10x + x^2) \right] dx$$

$$= \int_{x=0}^{x=5} \left[160 - 72x + 8x^2 - \frac{175}{2} + 35x - \frac{7}{2}x^2 \right] dx$$