Problem Set # 11

(due: April 23)

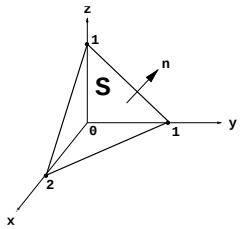
1. **Page 459** : # 10, 12.

2. Compute the area of the surface S parameterized by $\Phi(u, v) = (u\cos v,\, u\sin v,\, v)$ where $0 \le u \le \sqrt{8},\ 0 \le v \le u$.

3. Parameterize the surface S given by $y = x^2 + z^2 - 8$ where $1 \le x^2 + z^2 \le 4$. Find the area of the surface S.

4. Page 480 : # 3, 10.

5. Compute the surface integrals $\iint_S x\, dS$ and $\iint_S \vec{\mathbf{F}} \cdot d\vec{\mathbf{S}}$, where $\vec{\mathbf{F}}(x, y, z) = (z,\, 4x,\, 2y + 1)$ and S is that part of the plane $\dfrac{x}{2} + y + z = 1$ in the 1^{st} octant:



6. Compute the surface integral $\iint_S \vec{\mathbf{F}} \cdot d\vec{\mathbf{S}}$ where $\vec{\mathbf{F}}(x, y, z) = y\vec{\mathbf{i}} - x\vec{\mathbf{j}} + z\vec{\mathbf{k}}$ and S is that part of the paraboloid $z = 9 - x^2 - y^2$ which lies above the plane $z = 5$ and $\vec{\mathbf{N}}$ is the upward unit normal. What is the *flux* of $\vec{\mathbf{F}}$ across S ?