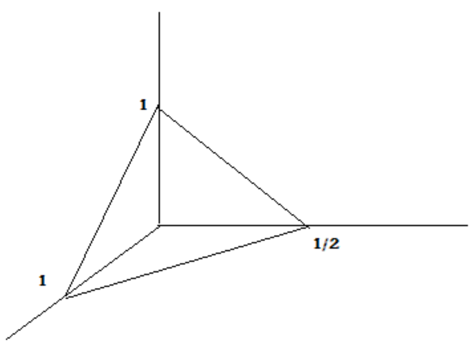
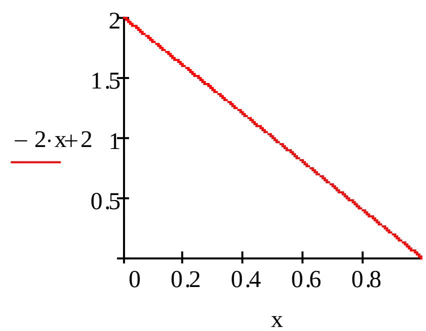
Let $\vec{F} = e^{-x}\cdot\vec{i} + e^{x}\cdot\vec{j} + e^{z}\cdot\vec{k}$ and σ be the the portion of the plane 2x + y +2z = 2 in the first octant. Use Stoke Thm to Calculate the line integral around the boundary oriented clockwise when viewed from above.

$$\nabla \times \vec{F} = \begin{pmatrix} \vec{i} & \vec{j} & \vec{k} \\ \frac{\delta}{\delta x} & \frac{\delta}{\delta y} & \frac{\delta}{\delta y} \\ e^{-x} & e^{x} & e^{z} \end{pmatrix} = e^{x}\cdot\vec{k}$$

For 2x + y +2z = 2 $\quad \vec{N} = \frac{-\delta z}{\delta x}\cdot\vec{i} - \frac{\delta z}{\delta y}\cdot\vec{j} + \vec{k} = \vec{i} + \frac{1}{2}\cdot\vec{j} + \vec{k}$





$$\int\int_{\sigma} \left(\nabla \times \vec{F}\right)\cdot\vec{n}\, d\mathbf{S} \;\; \mathbf{=} \int\int_{\mathbf{R}} \left(\nabla \times \vec{F}\right)\cdot\vec{N}\, d\,\mathbf{A}$$

$$\int\int_{\sigma} \left(\nabla \times \vec{F}\right)\cdot\vec{n}\, d\mathbf{S} \;\; \mathbf{=} \int\int_{\mathbf{R}} \left(\nabla \times \vec{F}\right)\cdot\vec{N}\, d\,\mathbf{A} \;\; = \;\; \int_{0}^{1}\int_{0}^{-2\cdot x+2} e^{x}\, dy\, dx$$