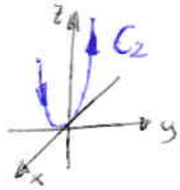
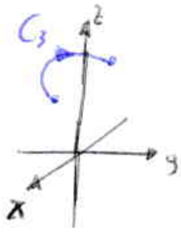
Así ∂S_1 será $C_1 + C_2$ y ∂S_2 será $C_3 + C_2^-$ con C_1, C_2, C_3 las siguientes curvas simples orientadas:

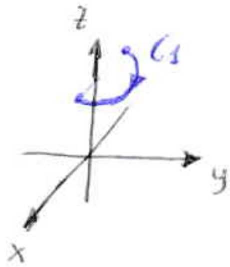
$$\gamma_2 : [-2,2] \longrightarrow \mathbb{R}^3 \qquad \text{con } \gamma_2([-2,2]) = C_2$$
$$t \longrightarrow \left(t, 0, \frac{t^2}{2}\right)$$



$$\gamma_3 : [\pi, 2\pi] \longrightarrow \mathbb{R}^3$$
$$t \longrightarrow (-2\cos t, 2\operatorname{sen} t, 2) \qquad \text{con } \gamma_3([\pi,2\pi]) = C_3$$



$$\gamma_1 : [0,\pi] \longrightarrow \mathbb{R}^3$$
$$t \longrightarrow (-2\cos t, 2\operatorname{sen} t, 2) \qquad \text{con } \gamma_1([0,\pi]) = C_1$$



Así aplicando el teorema de Stokes a las dos superficies (las hipótesis se verifican trivialmente):

$$\boxed{\iint_S \operatorname{rot}(\vec{F})\cdot d\vec{S}} = \iint_{S_1} \operatorname{rot}(\vec{F})\cdot d\vec{S} + \iint_{S_2} \operatorname{rot}(\vec{F})\cdot d\vec{S} =$$

$$= \iint_{C_1} \vec{F}\cdot d\vec{s} + \iint_{C_2} \vec{F}\cdot d\vec{s} + \iint_{C_2^-} \vec{F}\cdot d\vec{s} + \iint_{C_3} \vec{F}\cdot d\vec{s} = \iint_{C_3} \vec{F}\cdot d\vec{s} + \int_{C_2} \vec{F}\cdot d\vec{s} =$$

$$= \int_0^{2\pi} (3\cdot 2\operatorname{sen} t, +2\cos t\cdot 2, 2\operatorname{sen} t\cdot 4)\cdot(2\operatorname{sen} t, 2\cos t, 0)\, dt =$$

$$= \int_0^{2\pi} (12\operatorname{sen}^2 t + 8\cos^2 t)\,dt = \int_0^{2\pi} 4\operatorname{sen}^2 t\, dt + \int_0^{2\pi} 8\, dt = 4\left(\frac{1}{2}\int_0^{2\pi} dt - \frac{1}{2}\int_0^{2\pi}\cos 2t\, dt\right) +$$

$$+ 16\pi = 4\cdot\frac{2\pi}{2} + 16\pi = \boxed{20\pi}$$ que, naturalmente, es el mismo resultado que habíamos obtenido directamente.