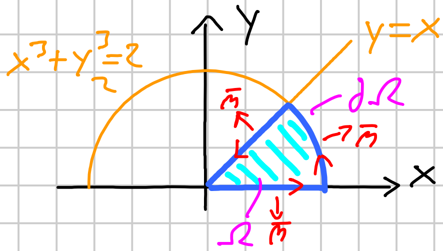
BY GIMUSI 08/06/15

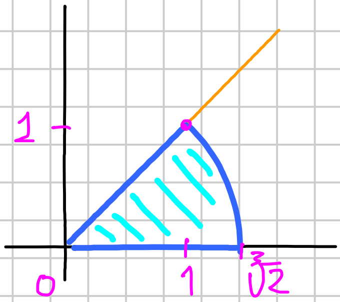
$\Omega: \ 0 \le y \le x \ , \ x^3 + y^3 \le 2$



$\vec{E} = \left(\sqrt{2} + \log(1+y^2),\ \arctan x + x^2 y\right)$

$$\int_{\partial\Omega} \vec{E}\cdot\vec{n}\, ds = \int_{\Omega} \operatorname{div} \vec{E}\, dx\, dy = \int_{\Omega} x^2\, dx\, dy$$

$$\int_{\Omega} x^2\, dx\, dy = \int_0^1 \int_0^x x^2\, dy\, dx + \int_1^{\sqrt[3]{2}} \int_0^{\sqrt[3]{2-x^3}} x^2\, dy\, dx$$



$$\int_0^1 \int_0^x x^2\, dy\, dx = \int_0^1 x^2 \cdot x\, dx = \left[\frac{x^5}{5}\right]_0^1 = \frac{1}{5}$$

$$\int_1^{\sqrt[3]{2}} \int_0^{\sqrt[3]{2-x^3}} x^2\, dy\, dx = \int_1^{\sqrt[3]{2}} x^2 \sqrt[3]{2-x^3}\, dx = \left[-\frac{1}{5}\left(2-x^3\right)^{5/3}\right]_1^{\sqrt[3]{2}} =$$

$$= -\frac{1}{5}(0-1) = \frac{1}{5}$$

$$\leadsto \int_{\partial\Omega} \vec{E}\cdot\vec{n}\, ds = \int_{\Omega} x^2\, dx\, dy = \frac{1}{5} + \frac{1}{5} = \frac{1}{2}$$