16-4.

#10.

$\vec{F} = (\underset{M}{x+3y}, \underset{N}{2x-y})$

$C: x^2+2y^2=2$

$r(t) = (\cancel{2\cos t}\ \sqrt{2}\cos t, \sin t) \quad 2\pi \ge t \ge 0$

use Green's Thm : $\oint \vec{F}(r(t)) \cdot r'(t)\,dt = \iint_R \frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\,dxdy$ (flow)

$\oint M dy - N dx = \iint_R \frac{\partial M}{\partial x} + \frac{\partial N}{\partial y}\,dxdy$ (flux)

circulation : $\iint_R (2-3)\,dxdy$

$= \int_{-1}^{1}\int_{-\sqrt{2-2y^2}}^{\sqrt{2-2y^2}} (-1)\,dx\,dy$

$= \int_{-\sqrt{2}}^{\sqrt{2}}\int_{-\sqrt{\frac{2-x^2}{2}}}^{\sqrt{\frac{2-x^2}{2}}} (-1)\,dy\,dx$

$= -\frac{2}{\sqrt{2}}\int_{-\sqrt{2}}^{\sqrt{2}} \sqrt{2-x^2}\,dx$

$\Rightarrow$ 圓上半 $(r=\sqrt{2})$

$= -\sqrt{2}\pi$

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flux : $\iint_R \frac{\partial M}{\partial x} + \frac{\partial N}{\partial y} = \iint_R 0\,dxdy = 0$

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