Math 2210-1
Monday 6 Dec.

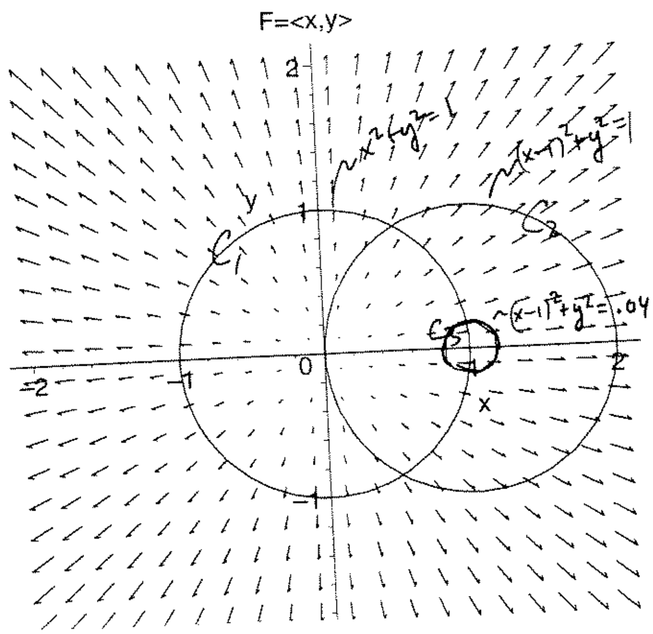
- Recall FTC
  single & multivariable

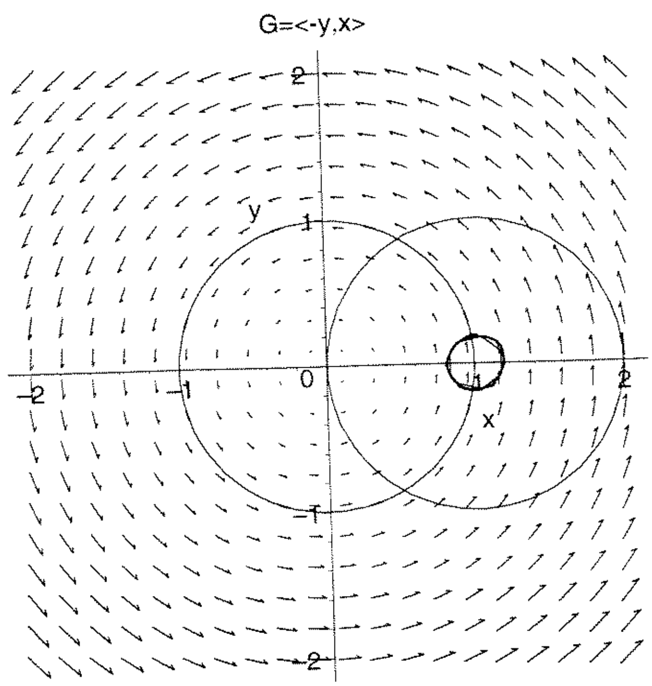
  (for $n=3$ case, the surface integrals on p. 3 Friday are missing their "dA"'s.)

- derive $n=2$ div. thm (page 5 Friday). $\iint_R \operatorname{div}\vec{F}\, dA = \int_{\partial R} \vec{F}\cdot\vec{n}\, ds$

Test it for $\vec{F} = \langle x, y\rangle$
$\vec{G} = \langle -y, x\rangle$

Notice — this theorem tells you what "divergence" is measuring!





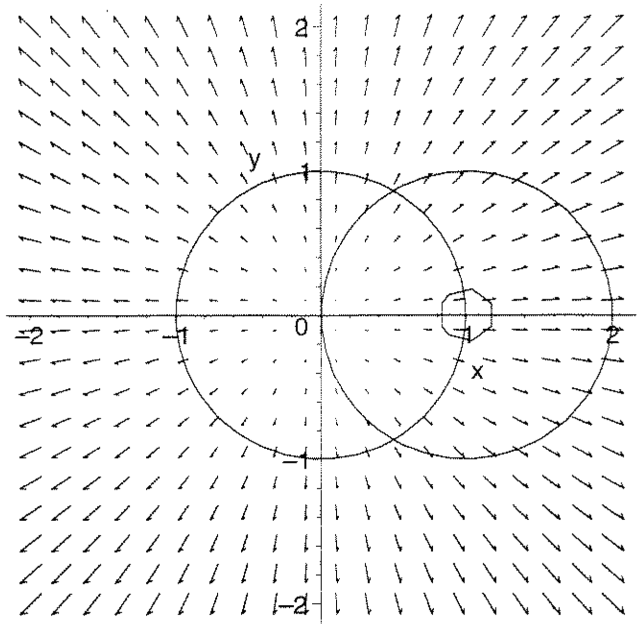
- derive $n=2$ Green's Thm (page 5 Fri.)

Test it for $\vec{F} = \langle x, y \rangle$
$\vec{G} = \langle -y, x \rangle$

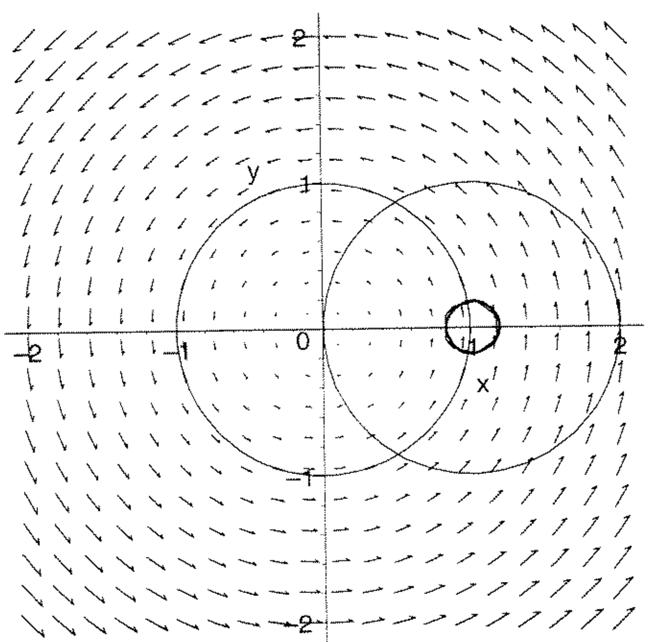
$$\iint_R Q_x - P_y \, dA = \oint_{\partial R} P\,dx + Q\,dy = \int_{\partial R} \langle P, Q \rangle \cdot \vec{T}\,ds$$

Notice - this theorem tells you what scalar curl is measuring!

F=<x,y>



G=<-y,x>



- Why the cross-partial condition $Q_x = P_y$ (in a rectangular domain) implies $\langle P, Q\rangle = \nabla f$ (page 6 Fri.)

$n=3$ div. thm. (see page 4 Fri)

$$\iiint_R \operatorname{div}\vec{F}\, dV = \iint_{\partial R} (\vec{F}\cdot\vec{n})\, dA$$

test it for $\vec{F} = \langle x, y, z\rangle$

R = unit ball centered at origin.