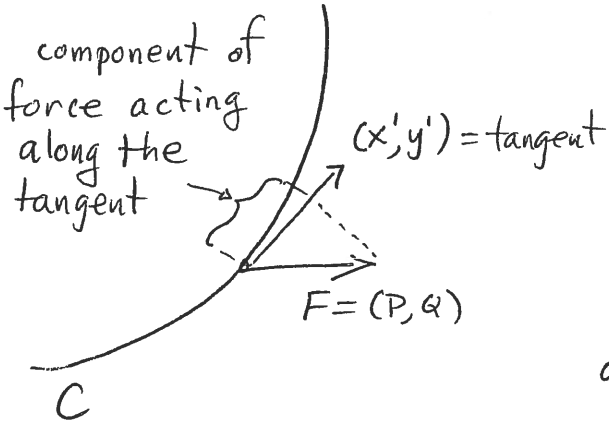
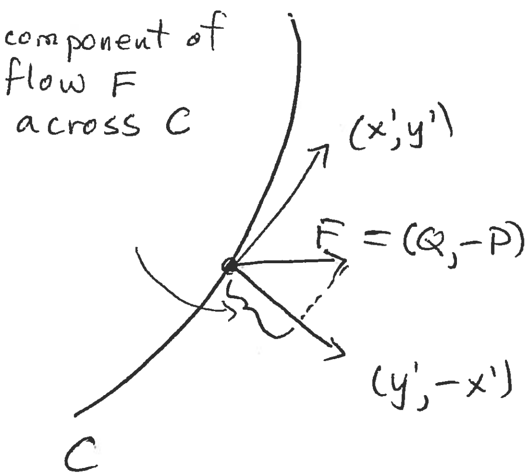


$$\int_C P\,dx + Q\,dy = \int Px' + Qy'\,dt$$
$$= \int (P,Q)\cdot(x',y')\,dt$$

and $(P,Q)\cdot(x',y')$ is the component of a force $F=(P,Q)$ acting along the tangent (x',y'), i.e. <u>work</u>.

so $\int_C P\,dx + Q\,dy$ = Total work done by force field (P,Q) on a particle which travels along C.



$$\int_C P\,dx + Q\,dy = \int Px' + Qy'\,dt$$
$$= \int (Q,-P)\cdot(y',-x')\,dt$$

and $(Q,-P)\cdot(y',-x')$ is the component of the flow with velocity $(Q,-P)$ which crosses C in the direction of the normal $(y',-x')$ to C,

So

$\int_C P\,dx + Q\,dy$ = Total flow across C if $F=(Q,-P)$ is the velocity vector field.