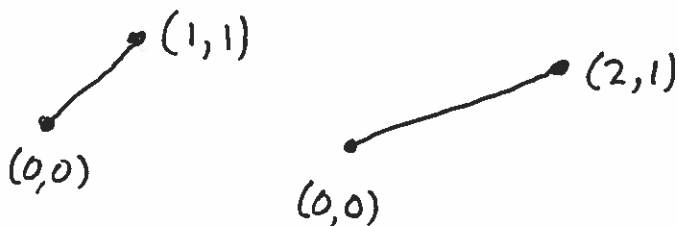


Jake's Ma21a Week 10 Worksheet

Vector fields $\vec{F}_1 = \langle -y, x \rangle$ $\vec{F}_2 = \left\langle \frac{-y}{x^2+y^2}, \frac{x}{x^2+y^2} \right\rangle$
 $\vec{F}_3 = \langle 1, x \rangle$ $\vec{F}_4 = \langle 2xy^2 + 3x^2, 2yx^2 \rangle$

Curves



Problems

① Compute $\nabla \times \vec{F}_i$ and $\nabla \times \nabla f$.

Ⓘ $\text{curl}(\langle P, Q \rangle)$
 $= \nabla \times \langle P, Q \rangle = Q_x - P_y$

Ⓜ $\int_C \vec{F} = \int_a^b \vec{F} \cdot \vec{r}'(t) dt$
where $\vec{r}(t)$ params C
from $a \leq t \leq b$

Ⓝ $\int_C \nabla f = \int_a^b \nabla f \cdot \vec{r}' dt = \int_a^b \frac{d}{dt} f dt$
 $= f(\vec{r}(b)) - f(\vec{r}(a))$

Ⓓ See next page.

② Find potential functions for \vec{F}_i if they exist.

③ Compute $\int_C \vec{F}_1$ $\int_C \vec{F}_3$ $\int_{-C} \vec{F}_3$

④ Compute $\int_D \vec{F}_4$

$$\int_{c_1} \vec{F} - \int_{c_2} \vec{F} = \int_{c_1 - c_2} \vec{F} = 0$$

Conservative

closed loops



irrotational

Green's Theorem
if $\nabla \times \vec{F} = 0$

$$\nabla \times \nabla f = 0$$

$$\int_c \nabla f = f(p) - f(p) = 0$$

gradient
derivatives

