1. Compute \( \int_C (6xy\vec{r} + 3x^2\vec{j}) \cdot d\vec{r} \) for a path beginning at (3, 0) and ending at (0, -3).

2. Compute \( \int_C \langle y^2, xy \rangle \cdot d\vec{r} \) for a path \( C \) given by \( \vec{r}(t) = \langle 2 + 3t, 1 - 5t \rangle \) for \( 0 \leq t \leq 1 \).
1. Compute \( \int_C \mathbf{F} \cdot d\mathbf{r} \) for the vector field \( \mathbf{F}(x, y) = \langle 2xy, x^2 - 6y \rangle \) and with \( C \) the sinusoidal path beginning at (3, 0) and ending at (-3, 0) and performing 17 complete oscillations on this interval.

2. Compute \( \int_C \mathbf{F} \cdot d\mathbf{r} \) for the vector field \( \mathbf{F}(x, y) = \mathbf{F}(x, y) = x^2 y \mathbf{i} + y^3 \mathbf{j} \) and with \( C \) an arc of a circle (centered at the origin) of radius 3 passing counterclockwise through the first and second quadrants.