1. Let $P$ be the parallelogram in the plane in the figure to the right. Write $C$ for the boundary curve of $P$.

   (a) Let $F(x, y) = (-y^2 + y, x^2 + y)$. Use Green’s theorem to rewrite $\int_C F \cdot d\mathbf{r}$ as a double integral. (2 points)

   \[
   \int_C F \cdot d\mathbf{r} =
   \]

   (b) Use a change of coordinates to rewrite your answer from part (a) as a double integral over the unit square $[0, 1] \times [0, 1]$. (3 points)

   (c) Evaluate the integral you found in part (c). (2 points)
2. Let $S$ be the surface parametrized by $\mathbf{r}(u,v) = (u^2 + 1, v^3 + 1, u + v)$. Find an equation for the tangent plane to $S$ at the point $\mathbf{r}(1,1)$. (3 points)