

These problems are worth 1pt a piece at least. Feel free to use Mathematica or some other CAS to illustrate as needed.

Problem 201 Calculate the integral below. Define C to be the CCW oriented triangle with vertices $(0, 0)$, $(0, 1)$ and $(1, 1)$.

$$\oint_C (xydx + x^2dy)$$

Problem 202 Let C be the CCW oriented circle $x^2 + y^2 = 1$. Calculate

$$\oint_C (3ydx + 5xdy)$$

Problem 203 Let C be the CCW oriented rectangle with vertices $(0, 0)$, $(a, 0)$, (a, b) and $(0, b)$. Calculate

$$\oint_C x^2 dy$$

Problem 204 Suppose that f, g are continuously differentiable on an simply connected open set R . Show that if C is any piecewise-smooth simple closed curve in R then

$$\oint [f(\vec{r})(\nabla g)(\vec{r}) + g(\vec{r})(\nabla f)(\vec{r})] \cdot d\vec{r} = 0$$