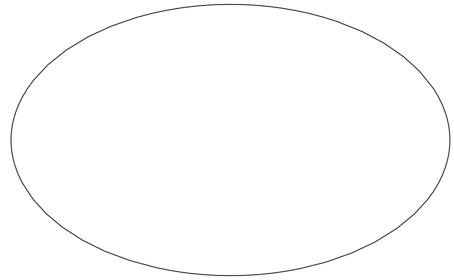


1) Look at the ellipse $C : r(t) = (a\cos(t), b\sin(t))$. By Green's theorem, the line integral of the vector field $F(x,y) = (0,x)$ along C gives the area A of the ellipse (which we know to be $A = \pi ab$).

	$r'(t) =$	
Let's do the calculation:	$F(r(t)) \cdot r'(t) =$	
	$\int_0^{2\pi} F(r(t)) \cdot r'(t)\, dt =$	

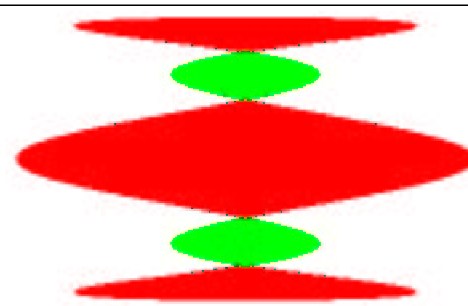
YOU SEE: The area calculation via **Green's theorem** was simpler than evaluating the 2D integral:

$$\int_{-a}^{a} \int_{-b\sqrt{1-x^2/a^2}}^{b\sqrt{1-x^2/a^2}} dy\, dx \ .$$

However, it would still have been possible to do the later.

2) Look at the deformed ellipse $C : r(t) = (a\cos(t) + 3\sin(3t), b\sin(t))$. What is the area of this curve? Now, the 2D integral would even be **more difficult** to do.

	$r'(t) =$	
Do the calculation	$F(r(t)) \cdot r'(t) =$	
	$\int_0^{2\pi} F(r(t)) \cdot r'(t)\, dt =$	



3) Look at the curve $C : r(t) = (a\cos(t) + 5\cos(5t), b\sin(t))$. What does Green's theorem say about the areas of regions defined by this curve? (Watch the orientation!)