Math 241 Section 15.4: Green's Theorem
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1. Green's Thm is a 2D theorem which relates the line integral of a vector field around a closed curve to the double integral over the region contained within that curve. Think: If R is a region then it has an edge C and Green's Theorem relates two integrals.

   Theorem: If R is a region in the xy-plane and C is the boundary, oriented counterclockwise, then

   $$\int_C M\,dx + N\,dy = \int\int_R N_x - M_y\,dA$$

2. Examples and Notes:
   (a) Example: With C the edge of a triangle.
   (b) Example: With C the edge of a quarter-disk in which the orientation is clockwise so we must negate.
   (c) Note: C must be closed.
   (d) Note: The left side is the same as $\int_C (M\,\mathbf{i} + N\,\mathbf{j}) \cdot d\mathbf{r}$ so keep an eye on that!