

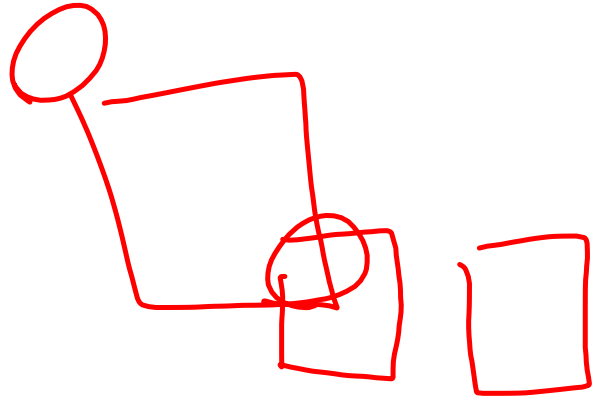
ALL THIS IS BASED ON  
SMOOTH Curves. That means  
 $\vec{r}$  &  $\vec{r}'$  are continuous.

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Scalar triple product

$$|\vec{a} \cdot (\vec{b} \times \vec{c})|$$

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$$



$$= a_1 (b_2 c_3 - b_3 c_2) - a_2 (b_1 c_3 - b_3 c_1) + a_3 (b_1 c_2 - b_2 c_1)$$

$$\langle b_1, b_2, b_3 \rangle \quad \cancel{b_1, b_2}$$

$$\langle c_1, c_2, c_3 \rangle \quad \cancel{c_1, c_2}$$

Green's Theorem  
 Stokes' Theorem

$$|a_1 (b_2 c_3 - b_3 c_2), a_2 (b_3 c_1 - b_1 c_3), a_3 (b_1 c_2 - b_2 c_1)|$$

$$= \text{a number.}$$