Steps for Analyzing Surface Integrals

We wish to **evaluate** an integral of the form:

$$\iint_S \mathbf{A}(\bar{r}_s) \cdot \overline{ds}$$

To successfully accomplish this, simply follow **these** steps:

Step 1: Determine the 1 equality, 2 inequalities, and $\overline{ds}$ for the surface S (be careful of direction!).

Step 2: **Evaluate** the dot product $\mathbf{A}(\bar{r}_s) \cdot \overline{ds}$.

Step 3: Write the resulting scalar field using the **same** coordinate system as surface S.

Step 4: Evaluate the scalar field using the coordinate **equality** that described surface S.

Step 5: Determine the **limits of integration** from the **inequalities** that describe surface S.

Step 6: Integrate the remaining function of **two** coordinate variables.