

Sketching area

To sketch the area of integration of a double polar integral, you'll need to analyze the function and evaluate both sets of limits separately.

Remember, you'll need to sketch the polar function on polar coordinate axes, where the r values represent the radius of a circle and the θ values will produce straight lines.

Example

Sketch the area given by the double polar integral.

$$\int_{\frac{\pi}{3}}^{\frac{3\pi}{4}} \int_1^3 r \, dr \, d\theta$$

To sketch the area defined by the double polar integral, we'll have to look at the function and both sets of limits of integration.

Let's first look at our inner integral. These are the limits with respect to r which means that on a polar graph these limits are simply the radius of two separate circles. This means that our function exists in the space between the two circles. The inner circle has a radius of 1 and the outer circle has a radius of 3.

Next we can analyze the outer integral. These limits are with respect to θ . On a polar graph, the angular points can be represented by straight lines from the origin.



Looking at our integral we can see that we'll have one line going through $\pi/3$ and the second line going through $3\pi/4$.

This means that our area of integration is bounded by the two circles and the two lines. The graph of this area looks like this

