

Name _____

Define

$$f(x, y) = \ln(x^2 + y^2)$$

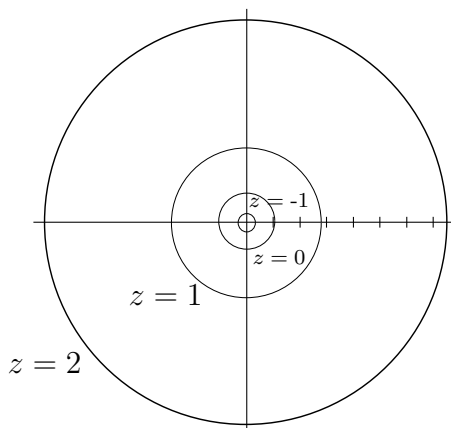
(a) Find the domain of f .**Solution**

The domain of $\ln(t)$ is all **positive** real numbers, so the domain of f is all pairs (x, y) such that $x^2 + y^2 > 0$. In other words the domain is

$$\{(x, y) \text{ in } \mathbb{R}^2 : (x, y) \neq (0, 0)\}.$$

(b) On a single xy -plane, sketch and label level curves for the z values -1, 0, 1, and 2.**Solution**

$z = -1$	$-1 = \ln(x^2 + y^2)$	$x^2 + y^2 = e^{-1}$
$z = 0$	$0 = \ln(x^2 + y^2)$	$x^2 + y^2 = 1$
$z = 1$	$1 = \ln(x^2 + y^2)$	$x^2 + y^2 = e$
$z = 2$	$2 = \ln(x^2 + y^2)$	$x^2 + y^2 = e^2$



(c) Sketch the surface in three dimensions.

Solution