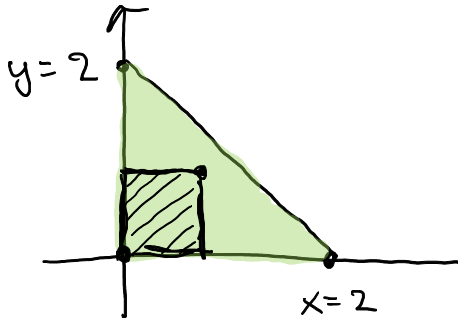


QUIZ, SEP 25

NAME:

**Maximizing Area.** (8 Pts) Find the maximal area of a rectangle which

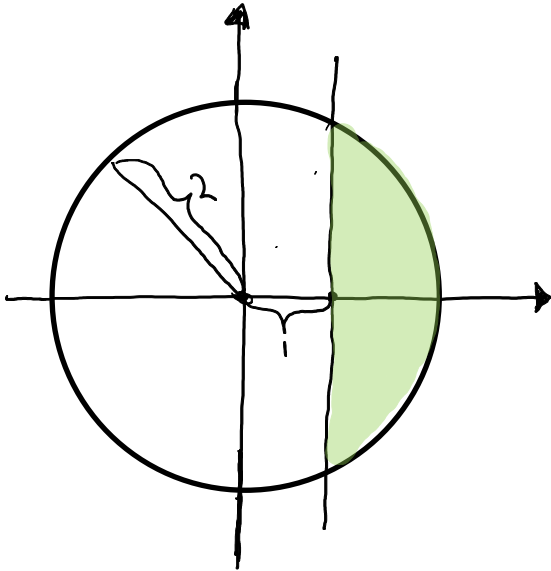
- Has sides parallel to the  $x$  and  $y$  axis
- Has one corner at the origin
- Has opposite corner contained in the shaded region drawn below.



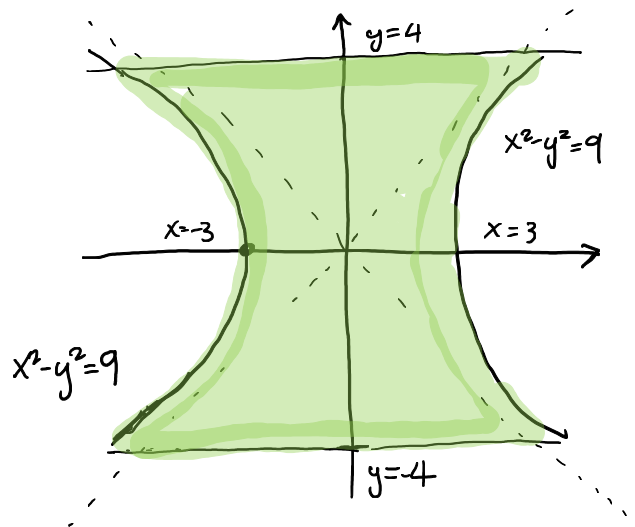
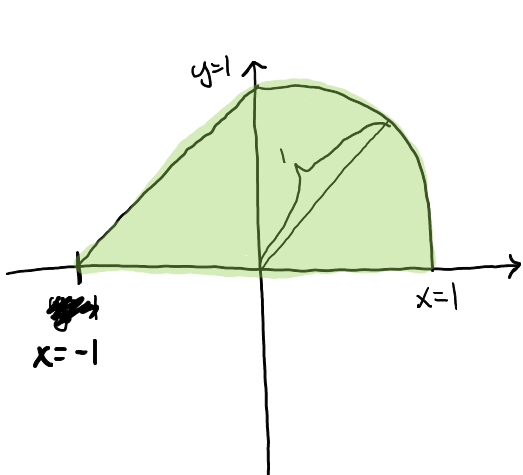
Critical point at  $(1, 1)$

At corners,  $f=0 \Rightarrow$

**Polar Coordinates.** (4 Pts) Write an integral computes the area of the shaded region using polar coordinates.



**Double Integrals.** (8 Pts) Write double integrals which compute the areas of each of the shaded regions:



**Bonus Problem.** *Worth no points!* Can you find a set of numbers  $a_{ij}$  where  $i, j \in \mathbb{N}$ , so that

$$\sum_{i=1}^{\infty} \sum_{j=1}^{\infty} a_{ij} = 1$$

but

$$\sum_{j=1}^{\infty} \sum_{i=1}^{\infty} a_{ij} = 0.$$

Use these functions to describe a function  $f(x, y)$  so that  $\iint f dx dy \neq \iint f dy dx$ . (This will be in an improper integral.)