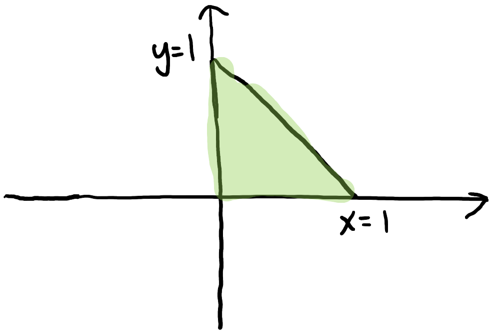
Makeup!

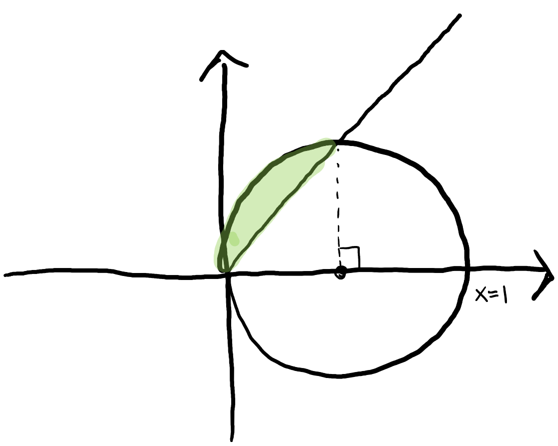
Quiz, ~~Sep 25~~

Name:

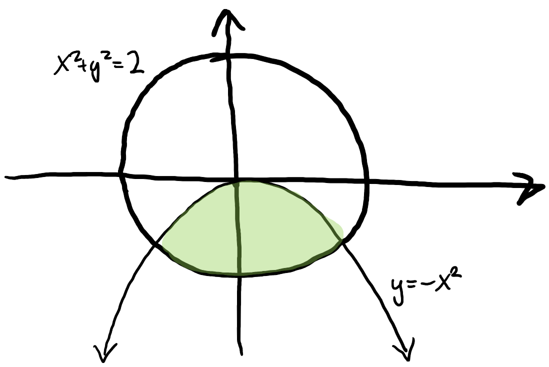
Maximizing a function. (8 Pts) Find the place where the function $f(x, y) = x^2 + y^2$ is maximized on the region drawn below

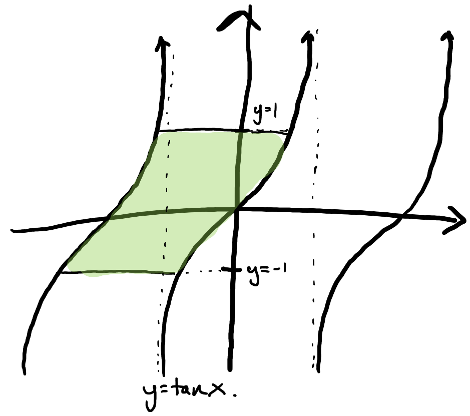


Polar Coordinates. (4 Pts) Write an integral computes the area of the shaded region using polar coordinates.



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





Bonus Problem. *Worth no points!* Consider the function $f(r:\theta) = \cancel{r\cos(3\theta)}$ $r\sin(3\theta)$. Without converting this function into (x, y) components, show that the directional derivatives

$$D_{\langle \cos\theta, \sin\theta \rangle} f(r:\theta)$$

are well defined at the origin. Then show that

$$\nabla f \cdot \langle \cos\theta, \sin\theta \rangle \neq D_{\langle \cos\theta, \sin\theta \rangle}$$

and conclude that this function is not differentiable.