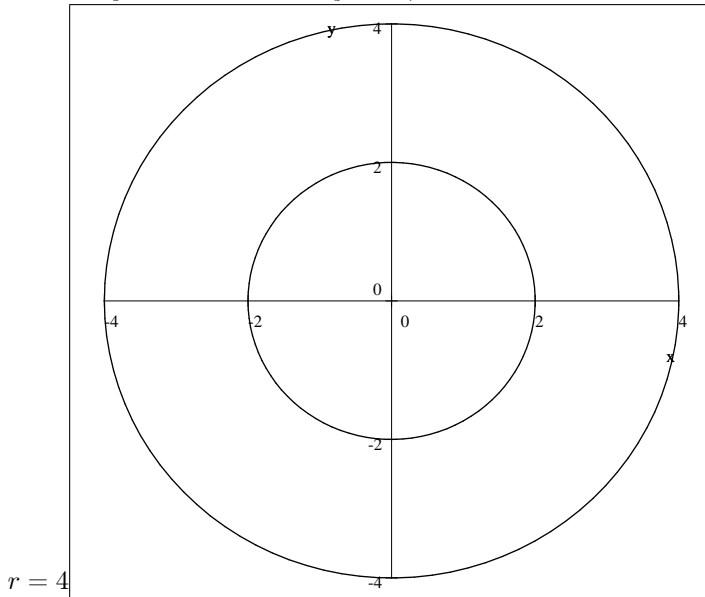


Name:.....Serial#:.....Sec #:.....

Q.1: Find and sketch the domain of the function $f(x, y) = \sqrt{-x^2 - y^2 + 16} + \ln(x^2 + y^2 - 4)$.

Sol: $-x^2 - y^2 + 16 \geq 0 \Rightarrow x^2 + y^2 \leq 16$, inside circle of radius 4
 $x^2 + y^2 - 4 > 0 \Rightarrow x^2 + y^2 > 4$, outside circle of radius 2.



Q.2: Show that the limit $\lim_{(x,y) \rightarrow (0,0)} \frac{6xy}{2x^2 + 3y^2}$ does not exist.

Sol: Let $y = mx$, then $\lim_{(x,y) \rightarrow (0,0)} \frac{6xy}{2x^2 + 3y^2} = \lim_{x \rightarrow 0} \frac{6x^2m}{2x^2 + 3m^2x^2} = \lim_{x \rightarrow 0} \frac{6m}{2 + 3m^2}$. Thus Limit is not unique.

Q.3: Find all the second order partial derivatives of $f(x, y) = \ln(-2x + 3y)$.

Sol: $f(x, y) = \ln(-2x + 3y) \Rightarrow f_x = \frac{-2}{-2x + 3y}, f_y = \frac{3}{-2x + 3y}$ and $f_{xx} = \frac{-4}{(-2x + 3y)^2}, f_{yy} = \frac{-9}{(-2x + 3y)^2}, f_{xy} = \frac{6}{(-2x + 3y)^2}$.