Math 240, Quiz #5, Summer 2017 Name KEY

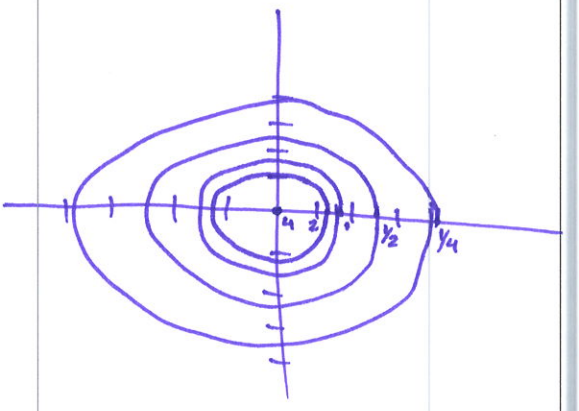
Instructions: Show all work. Use exact answers unless specifically asked to round.

1. Sketch 8 level curves for $z = \frac{4}{1+x^2+y^2}$, and use that information to sketch the graph of the function.

$z(1+x^2+y^2) = 4$ range $(0, 4]$

$1 + x^2 + y^2 = \frac{4}{z}$

$x^2 + y^2 = \frac{4}{z} - 1$



z	$\frac{4}{z} - 1$	
1	$4-1=3$	$r=\sqrt{3}$
2	$2-1=1$	$r=\sqrt{2}$
4	$1-1=0$	
$\frac{1}{2}$	$8-1=7$	$r=\sqrt{7}$
$\frac{1}{4}$	$16-1=15$	$r=\sqrt{15}$

keep going

answers will vary

2. Find the both first partial derivatives for the functions.

a. $z = \frac{xy}{x^2+y^2}$

$z_x = \frac{y(x^2+y^2) - xy(2x)}{(x^2+y^2)^2} = \frac{x^2y + y^3 - 2x^2y}{(x^2+y^2)^2} = \frac{y^3 - x^2y}{(x^2+y^2)^2}$

$z_y = \frac{x(x^2+y^2) - xy(2y)}{(x^2+y^2)^2} = \frac{x^3 + xy^2 - 2xy^2}{(x^2+y^2)^2} = \frac{x^3 - xy^2}{(x^2+y^2)^2}$

b. $z = \sinh(2x+3y)$

$z_x = 2\cosh(2x+3y)$

$z_y = 3\cosh(2x+3y)$