

Math 241 Class Exercise: Multivariable Functions and  
Graphing part 2  
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For the following exercises, graph the functions as accurately as possible. Keep in mind that the best way is to look at cross sections. In general, a good starting point is to look at the curves in the x-y, x-z, y-z planes obtained by setting the values  $z = 0$ ,  $y = 0$ , and  $x = 0$  respectively. Also look at the level curves ( $z = k$ ) as well as those obtained from setting  $x = \text{constant}$  and  $y = \text{constant}$ .

1. Accurately graph the function  $f(x, y) = \frac{1}{1+x^2+y^2}$
2. Accurately graph the function  $f(x, y) = y^2 - x^2$
3. Accurately graph the function  $f(x, y) = e^{x^2+y^2}$
4. Investigate the family of functions  $f(x, y) = e^{cx^2+y^2}$ . How does the shape of the graph depend on  $c$ ?