Math 53 (Multivariable Calculus), Section 102 & 108
Week 6, Wednesday
Sep 28, 2022
For the other materials: seewoo5.github.io/teaching/2022Fall

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1. Graph the functions.
   (a) $f(x,y) = \sqrt{x^2+y^2}$
   (b) $f(x,y) = e^{\sqrt{x^2+y^2}}$
   (c) $f(x,y) = \ln(x^2+y^2)$

   What do they have in common? Can you also graph the following function?

$$f(x,y) = \sqrt{1-(\sqrt{x^2+y^2}-2)^2}$$

2. Consider the following limit:

$$\lim_{(x,y)\to(0,0)} \frac{x^2y^3}{x^4+y^6}$$

   (a) Show that the limit along line $y = mx$ exists and the same for all m.
   (b) Show that, for any positive integer n, the limit along $y = mx^n$ exists and the same for all m.
   (c) Show that the limit does not exist.