Math 53 (Multivariable Calculus), Section 102 & 108
Week 7, Monday
Oct 3, 2022
For the other materials: seewoo5.github.io/teaching/2022Fall

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1. Show that
$$c(x,t) = \frac{1}{\sqrt{4\pi Dt}} e^{-x^2/(4Dt)}$$
is a solution of the *diffusion equation*
$$\frac{\partial c}{\partial t} = D\frac{\partial^2 c}{\partial x^2}.$$

2. Let
$$f(x,y) = \begin{cases} \frac{x^2y^2}{x^2+y^2} & (x,y) \neq (0,0) \\ 0 & (x,y) = (0,0) \end{cases}$$
   (a) Compute $f_x(0,0)$, $f_y(0,0)$, $f_{xy}(0,0)$, $f_{yx}(0,0)$. Check that $f_{xy}(0,0) = f_{yx}(0,0)$.
   (b) Show that both f_{xy} and f_{yx} are not continuous at $(0,0)$.