

Math 241, Final Exam, Fall, 2020

The exam ends at 6:30 on Wednesday, December 9, 2020. Please e-mail your solutions to me by 6:35. My e-mail address is

kustin@math.sc.edu

I will acknowledge receipt of your exam. If you haven't heard from me within say a half hour of sending your solutions, you probably should get in touch with me.

You may use your notes, the class notes, the textbook, any information source (a textbook or Wikipedia) on the Internet that you have already been using. **I expect you to do the problems by yourself. Do not use a calculator or a computer to do the problems.**

The exam is worth 30 points. Please make your work coherent, complete, and correct. Please **CIRCLE** your answer. Please **CHECK** your answer whenever possible.

- (1) (8 points) Find the area between $x + y^2 = 1$ and $y = x + 1$.
- (2) (8 points) Consider the function $f(x, y) = y^2 - x^2$.
 - (a) Draw the level set $f(x, y) = c$ which passes through the point $P_0 = (1, 2)$.
 - (b) Calculate $\vec{\nabla} f|_{P_0}$.
 - (c) Draw $\vec{\nabla} f|_{P_0}$ with the tail of $\vec{\nabla} f|_{P_0}$ placed on the point P_0 .
- (3) (7 points) Find the volume of the solid between the surface $z = 4 - x^2 - y^2$ and the xy -plane.
- (4) (7 points) Compute $\int_0^3 \int_{x/3}^1 e^{y^2} dy dx$.