MATH 203 Calculus III

Homework 15

Basic Information

This assignment is due on Gradescope by **1:30 PM on Friday, April 4**.

Make sure you understand MHC honor code and have carefully read and understood the additional information on the class syllabus. I am happy to discuss any questions or concerns you have!

Since this is a 200-level mathematics course, quite a few homework questions will ask you to explain your reasoning or process for solving a problem. Whenever possible, write your explanations in complete sentences and write your answers as if you were explaining to a peer in the class.

The homework problems will be graded anonymously so please do not put your name or other identifying information on the pages.

Turn In Problems

- #1. Use Lagrange multipliers to find the shortest distance from $(2,-2,3)$ to the plane $2x + 3y - z = 1$. (Yes, this is the same problem as in HW 12 but you are to use Lagrange multipliers this time.).
- #2. Use Lagrange multipliers to find the maximum and minimum values of the function $f(x, y, z) = 2x + 6y + 10z$ subject to the constraint $x^2 + y^2 + z^2 = 35$.
- 13.1 6b
- 13.2 6
- #5. Find a Cartesian equation for the curve described by the polar equation . $r\cos(\theta) = 1$.
- #6. *Without computing any integrals,* determine $\displaystyle\iint_R 3\ dA$ for $R = [-2,\ 2] \times [1,\ 6]$. Suggestion: this represents the volume of a well known shape.
- #7. Calculate $\displaystyle\int_0^1 \int_1^2 \frac{xe^{x^2}}{y}\ dy\ dx$.

Additional Problems (to do on your own, not to turn in)

- 13.1: 5b
- 13.2: 5
- Calculate $\displaystyle\int_0^1 \int_0^1 xy\sqrt{x^2 + y^2}\ dy\ dx$.

(More on the next page...)

- Use Lagrange multipliers to find the volume of the largest rectangular box in the first octant with three faces in the coordinate planes and one vertex in the plane $x + 2y + 3z = 6$
- Do the previous problem using techniques from 12.8 instead.