

## Basic Information

This assignment is due on Gradescope by **1:30 PM on Tuesday, March 25**.

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

- 12.8: 14
- #2. Find three positive numbers whose sum is 90 and whose product is maximum. You must use the
- #3.<sup>1</sup>. In Calculus I, if a continuous function has only one critical number which corresponds to a relative max, then that local max must be an absolute max. However, for functions of two variables, this is not true.
  - (a) Show that the function  $f(x, y) = 3xe^y - x^3 - e^{3y}$  has one critical point that is a maximum.
  - (b) Graph that function in Desmos and then explain how it is possible to only have one critical point which is not an absolute maximum nor an absolute minimum.

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

- 12.8: 13
- Blood types (A, B, AB, O) are determined by *alleles* A, B, and O, and each person has two alleles. The proportion of individuals in a population who carry two *different* alleles (eg. AB, AO, BO) is given by the Hardy-Weinberg Law:  $p = 2pq + 2pr + 2rq$  where  $r$ ,  $q$ , and  $p$  are the proportions of A, B, and O in the population. Use the fact that  $p + q + r = 1$  to show that  $P$  is at most  $2/3$ .

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<sup>1</sup> Problem 2, 3 and the word problem in the additional problems are from Stewart Calculus: Early Transcendentals 6th edition, page 931-932