MATH 20C
WINTER 2020
SECTION D00 (MANNERS)

HOMEWORK – WEEK 8

Due by 2359 (11:59 PM) on Sunday March 1. Hand in via Gradescope.

For problem 0, credit is awarded for any honest response, not for the amount of work undertaken.

For problems 1, 2 and 3, you *must* give a fully written-out solution showing all your working and justification. Stating the correct answer, by itself, will earn no credit.

0. Do the following textbook problems. *Do not turn them in*, but provide a list here of those for which you wrote down solutions.

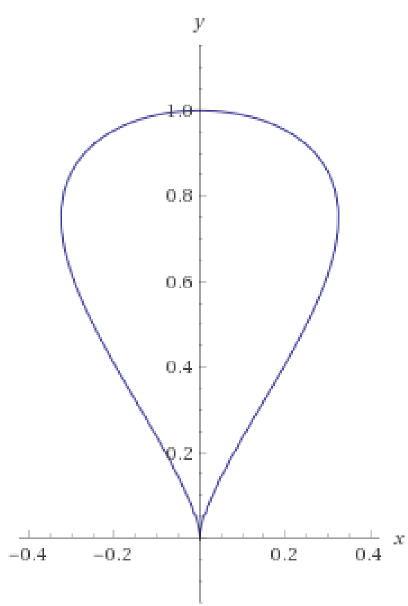
§3.4: 1,3,5,7.

(*1 points*)

1. Find the maximum and minum values of the function $f(x, y) = x + 0.9y$ on the curve

$$C = \{(x, y) \in \mathbb{R}^2 : x^2 - y^3 + y^4 = 0\}.$$

You may assume without proof that C, shown below, is closed and bounded.



[**Hint**: you may use that the equation $16z^3 - 24z^2 + (12.24)z - (3.24) = 0$ has a single solution at $z = 0.9$.]

(6 points)

2. Consider the function

$$f(x, y) = x^2 + xy + y^2.$$

(a) Using the method of Lagrange Multipliers, find the maximum and minimum values of f on the unit circle $\{(x, y) \in \mathbb{R}^2 \colon x^2 + y^2 = 1\}$.

(b) Using your answer to (a), find the maximum and minimum values of f on the unit disc $\{(x, y) \in \mathbb{R}^2 \colon x^2 + y^2 \leq 1\}$.

(6 points)

3. If x, y, z are three real numbers such that $x^4 + y^4 + z^4 = 243$, what is the largest possible value of xyz? Justify your answer.

(6 points)