

**MATH 281 (PHILLIPS), FALL 2020: WRITTEN
HOMEWORK 8**

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This homework assignment is due Friday 4 Dec. 2020 at 10:00 pm (note change from regular schedule), to be uploaded as a pdf file (or one of a few other allowed file types) on the University of Oregon Canvas site.

General instructions: This assignment is intended to be done in small groups, but each person must submit their own written version, in their own words, and being sure to understand everything completely.

Show work in all problems, and be very careful to use fully correct notation. Incorrect notation will lose credit on exams (grading is based on what you write, not what you meant), and the written homework assignments are your chance to have me tell you whether your notation is correct.

Files turned in must have good enough resolution that I can read them easily.

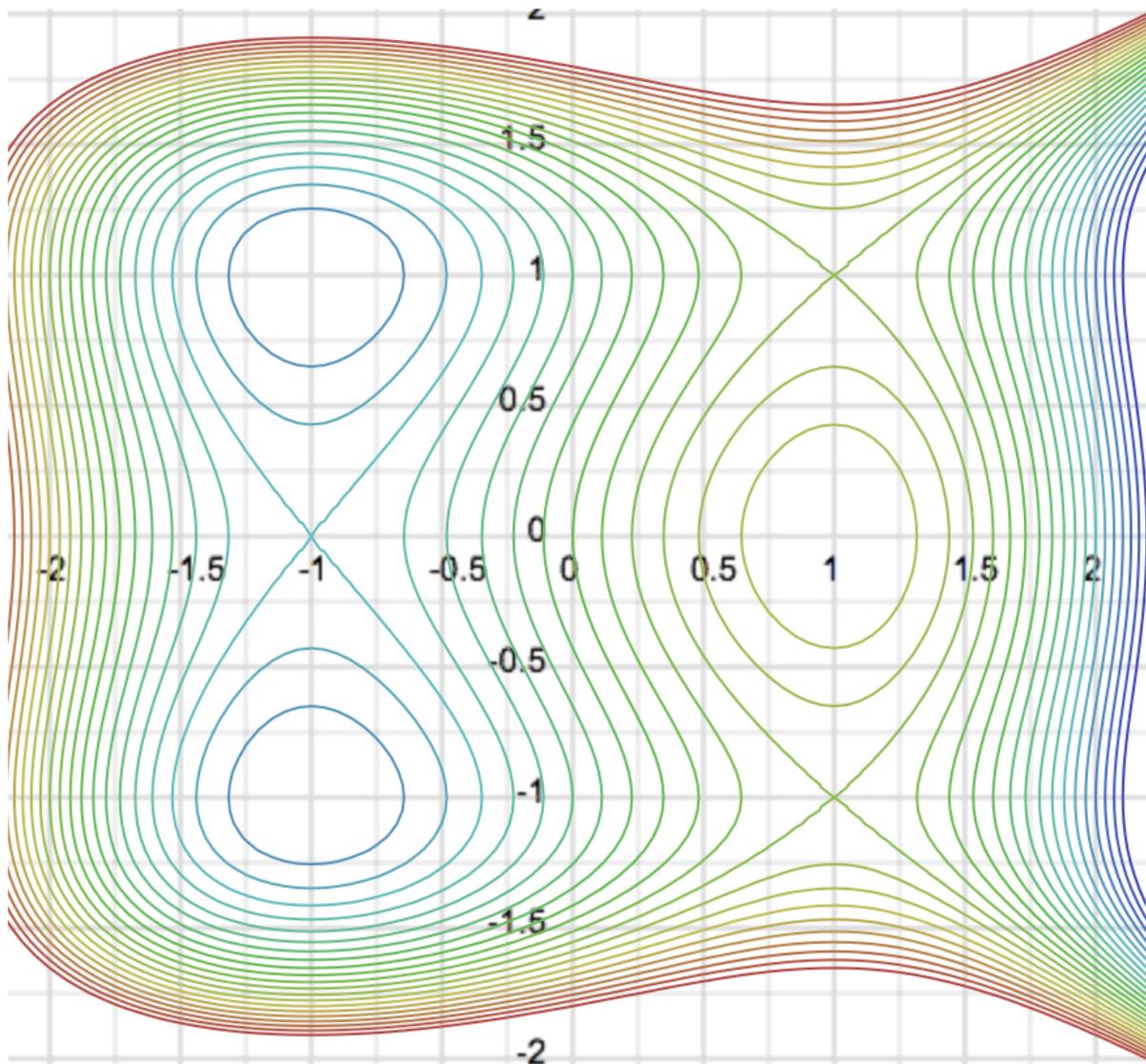
Apart from the extension (such as “.pdf”), your file name should contain only numbers, capital and lowercase letters, and underscores. In particular, **no** spaces or parentheses. You do not need to put any identifying information in the file name; “HW8.pdf” is quite sufficient. (The Canvas system adds enough identifying information.)

Write your name on all pages. On the first page, also write the names of all those people you worked with.

Problem 1 (10 points). Use Lagrange multipliers to find the maximum and minimum values of $4x + \frac{1}{2}y$ on the surface given by $x^4 = 17 - y^4$, and where they occur.

Problem 2 (10 points). Find the maximum and minimum values of $x^2 + 2y - xy$ on the closed filled in triangle T with vertices at $(0, 0)$, $(0, 2)$, and $(4, 0)$, and where they occur.

Problem 3 (5 points). The picture below is a partial of a contour plot of a function $z = Q(x, y)$. The contour lines are evenly spaced, with the darkest red (at the top and bottom) being at the value 4 and the darkest blue (at the right) being at the value -4 .



For each of the following quantities, determine whether it is near zero, clearly positive, or clearly negative. In each case give a brief explanation.

- (1) $D_2Q(0, 0)$.
- (2) $D_1^2Q(-1, 1)$. (In the book's most common notation, this is $Q_{xx}(-1, 1)$.)
- (3) $Q(0.5, 1.5) - Q(0.5, 2)$. (Assume the behavior of the function continues in the same way beyond the last contour line shown.)
- (4) $D_1Q(0, -1.5)$.
- (5) $D_2Q(0, -1.5)$.